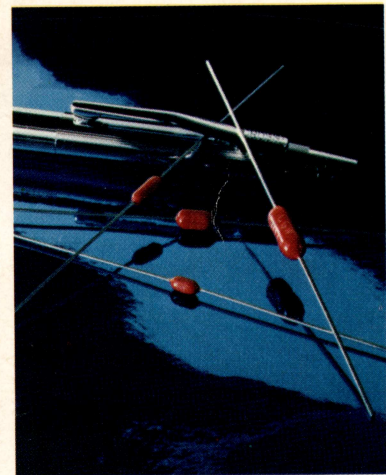
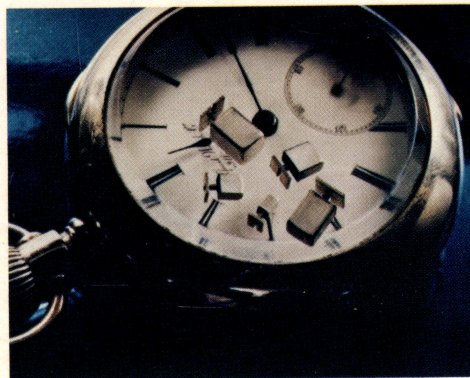
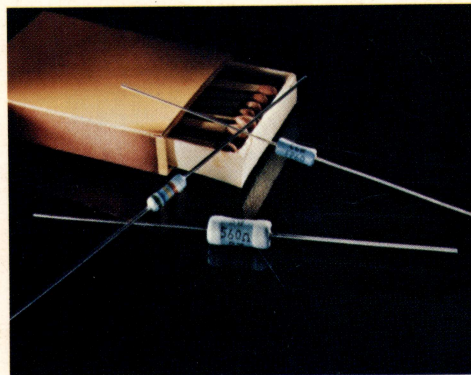
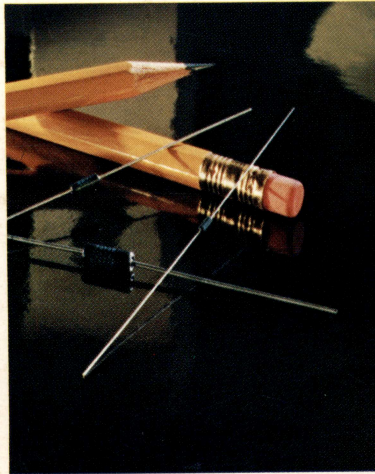
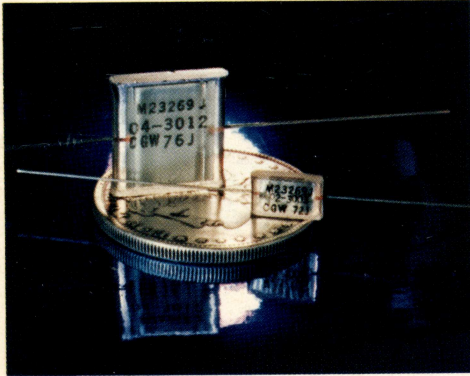


GILMORE



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CORNING/MIL RESISTOR SUMMARY

Mil Type	Mil Spec (Mil-R-)	Corning Style	Volt Rating	Resistance Range	Standard Tolerance	PPM/°C Temp. Coeff.
	None	C3	200	10Ω-150K	1,2,5%	100PPM
RL07S	22684	C4	250	10Ω-301K	1,2,5%	100PPM
RL20S	22684	C5	350	10Ω-1 Meg	1,2,5%	100PPM
RL32S	22684	C6	500	10Ω-2 Meg	1,2,5%	100PPM
	None	C05	200	10Ω-150K	2,5,10%	200PPM
RL07S	22684	C07	250	10Ω-301K	2,5,10%	200PPM
RL20S	22684	CS20	350	10Ω-1 Meg	2,5,10%	200PPM
RL32S	22684	FP32	500	10Ω-1 Meg	2,5,10%	200PPM
RL42S	22684	FP42	500	10Ω-1.5 Meg	2,5,10%	200PPM
RN55D	10509	NA55	200	49.9Ω-150K 10Ω-301K	.5% 1%	100PPM
RN60D	10509	NA60	300	49.9Ω-499K 10Ω-1M	.5% 1%	100PPM
RN65D	10509	NA65	350	49.9Ω-1M 10Ω-2M	.5% 1%	100PPM
RN70D	10509	NA70	500	51.1Ω-1M	.5,1%	100PPM
RN50C	10509	NC3	200	49.9Ω-100K	.5, 1%	50PPM
RN55C	10509	NC55	200	49.9Ω-1M	.1, .25, .5, 1%	50PPM
RN60C	10509	NC60	250	49.9Ω-1M	.1, .25, .5, 1%	50PPM
RN65C	10509	MC65	300	49.9Ω-1M	.1, .25%	50PPM
RN65C	10509	NC6	300	49.9Ω-1M	.5, 1%	50PPM
RN70C	10509	NC7	350	51.1Ω-1M	.5, 1%	50PPM
RN55E	10509	NE55	200	49.9Ω-1M	.1, .25, .5, 1%	25PPM
RN60E	10509	NE60	250	49.9Ω-1M	.1, .25, .5, 1%	25PPM
RN65E	10509	ME65	300	49.9Ω-1M	.1, .25, .5, 1%	25PPM
RNC50H	55182	MH50	200	49.9Ω-150K	.1, .5, 1%	25PPM
RNC50J	55182	MJ50	200	10Ω-48.7Ω 49.9Ω-150K	.5, 1% .1, .5, 1%	50PPM
RNC50K	55182	MK50	200	10Ω-301K	.5, 1%	100PPM
RNC55K	55182	MK55	200	10Ω-301K	.5, 1%	100PPM
RNC55H	55182	MH55	200	10Ω-48.7Ω 49.9Ω-301K	.5, 1% .1, .5, 1%	50PPM
RNC55J	55182	MJ55	200	49.9Ω-301K	.1, .5, 1%	25PPM
RNC60K	55182	MK60	250	10Ω-499K	.5, 1%	100PPM
RNC60H	55182	MH60	250	10Ω-48.7Ω 49.9Ω-499K	.5, 1% .1, .5, 1%	50PPM
RNC60J	55182	MJ60	250	49.9Ω-499K	.1, .5, 1%	25PPM
RNC65K	55182	MK65	300	10Ω-1M	.5, 1%	100PPM
RNC65H	55182	MH65	300	49.9Ω-1M	.1, .5, 1%	50PPM
RNC65J	55182	MJ65	300	49.9Ω-1M	.1, .5, 1%	25PPM
RLR05C	39017	HC3	200	10Ω-150K	1,2,5%	100PPM
RLR07C	39017	HC4	250	10Ω-300K	1,2,5%	100PPM
RLR20C	39017	HC5	350	10Ω-1M	1,2,5%	100PPM
RLR32C	39017	HC6	500	10Ω-1M	1,2,5%	100PPM

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For the Following:

- Placement of Orders
- Price Quotations
- Delivery
- Specifications or drawing reviews
- Samples
- Location of a franchised distributor
- Technical Information
 - Product Capabilities
 - Applications Assistance

Contact:**Customer Service**

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RESISTORS — ALPHABETICAL LISTING OF MILITARY PART NUMBERS

Military Part No.	Corning Part No.	Component Type	Page No.	Military Part No.	Corning Part No.	Component Type	Page No.
RL07	C4/C07	Resistor	14	RN70C	NC7	Resistor	6
RL20	C5/CS20	Resistor	14	RN55D	NA55	Resistor	8
RL32	C6/FP32	Resistor	14	RN60D	NA60	Resistor	8
RL42	FP42	Resistor	14	RN65D	NA65	Resistor	8
RLR05	HC3	Resistor	10	RN70D	NA70	Resistor	8
RLR07	HC4	Resistor	10	RN55E	NE55	Resistor	6
RLR20	HC5	Resistor	10	RN60E	NE60	Resistor	6
RLR32	HC6	Resistor	10	RN65E	ME65	Resistor	6
RN50C	NC3	Resistor	6	RNC50	MJ, MH, MK50	Resistor	12
RN55C	NC55	Resistor	6	RNC55	MJ, MH, MK55	Resistor	12
RN60C	NC60	Resistor	6	RNC60	MJ, MH, MK60	Resistor	12
RN65C	MC65/NC6	Resistor	6	RNC65	MJ, MH, MK65	Resistor	12

RESISTORS — MILITARY SPECIFICATION CROSS-REFERENCE

Military Specification	Military Part No.	Corning Part No.	Page No.	Military Specification	Military Part No.	Corning Part No.	Page No.
MIL-R-10509 (Precision Metal Film Resistors)	RN50C	NC3	6	MIL-R-22684 (Semi-Precision Metal Film Resistors)	RL07	C4/C07	14
	RN55C	NC55	6		RL20	C5/CS20	14
	RN60C	NC60	6		RL32	C6/FP32	14
	RN65C	MC65/NC6	6		RL42	FP42	14
	RN70C	NC7	6	MIL-R-39017 (Established Reliability Semi-Precision Metal Film Resistors)	RLR05	HC3	10
	RN55D	NA55	8		RLR07	HC4	10
	RN60D	NA60	8		RLR20	HC5	10
	RN65D	NA65	8		RLR32	HC6	10
	RN70D	NA70	8	MIL-R-55182 (Established Reliability Precision Metal Film Resistors)	RNC50	MJ, MH, MK50	12
	RN55E	NE55	6		RNC55	MJ, MH, MK55	12
	RN60E	NE60	6		RNC60	MJ, MH, MK60	12
	RN65E	ME65	6		RNC65	MJ, MH, MK65	12

RESISTORS — ALPHABETICAL LISTING OF CORNING PART NUMBERS

Corning Part No.	Military Part No.	Component Type	Page No.	Corning Part No.	Military Part No.	Component Type	Page No.
C3	None	Resistor	14	FP67	None	Resistor	16
C4	RL07	Resistor	14	FP69	None	Resistor	16
C5	RL20	Resistor	14	HC3	RLR05	Resistor	10
C6	RL32	Resistor	14	HC4	RLR07	Resistor	10
C05	None	Resistor	14	HC5	RLR20	Resistor	10
C07	RL07	Resistor	14	HC6	RLR32	Resistor	10
CS20	RL20	Resistor	14	L04C	None	Resistor	20
FL4C	None	Resistor	20	L05C	None	Resistor	20
FL5C	None	Resistor	20	L04D	None	Resistor	20
FL4D	None	Resistor	20	L05D	None	Resistor	20
FL5D	None	Resistor	20	MC65	RN65C	Resistor	6
FP $\frac{1}{4}$	None	Resistor	16	ME65	RN65E	Resistor	6
FP $\frac{1}{2}$	None	Resistor	16	MJ, MH, MK50	RNC50	Resistor	12
FP1	None	Resistor	16	MJ, MH, MK55	RNC55	Resistor	12
FP2	None	Resistor	16	MJ, MH, MK60	RNC60	Resistor	12
FP3	None	Resistor	16	MJ, MH, MK65	RNC65	Resistor	12
FP4	None	Resistor	16	NA55	RN55D	Resistor	8
FP5	None	Resistor	16	NA60	RN60D	Resistor	8
FP7	None	Resistor	16	NA65	RN65D	Resistor	8
FP10	None	Resistor	16	NA70	RN70D	Resistor	8
FP32	RL32	Resistor	14	NC3	RN50C	Resistor	6
FP42	RL42	Resistor	14	NC6	RN65C	Resistor	6
FP55	None	Resistor	18	NC7	RN70C	Resistor	6
FP55C	None	Resistor	18	NC55	RN55C	Resistor	6
FP55E	None	Resistor	18	NC60	RN60C	Resistor	6
FP60	None	Resistor	18	NE55	RN55E	Resistor	6
FP60C	None	Resistor	18	NE60	RN60E	Resistor	6
FP60E	None	Resistor	18				

PROVEN STABILITY

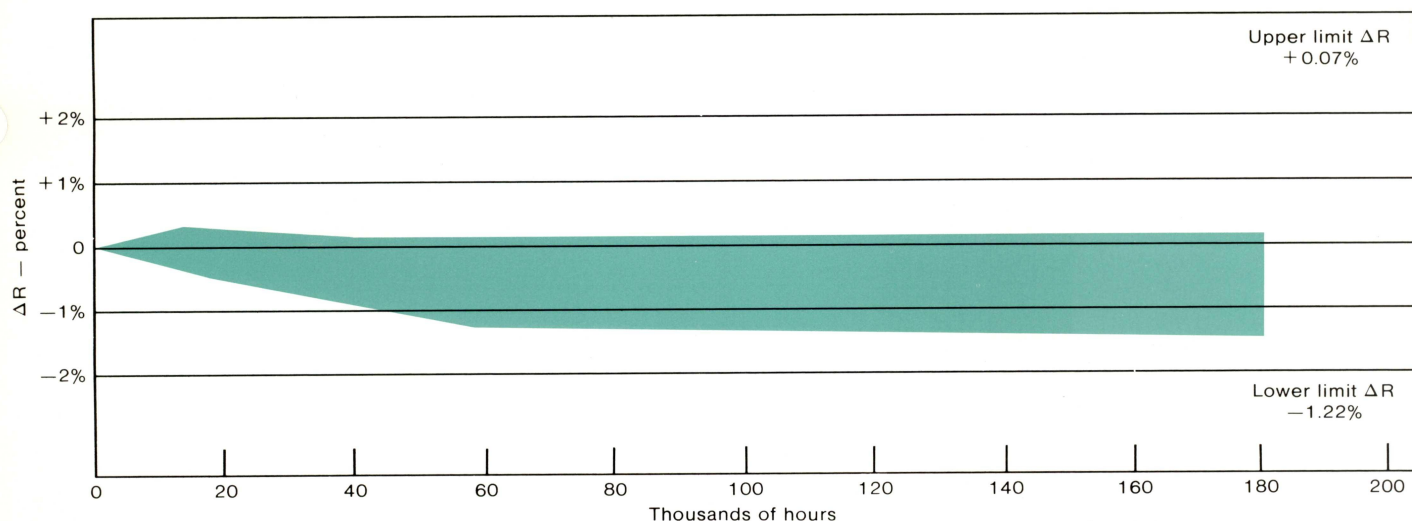
In 1956, Remington Rand Univac Division of Sperry Rand Corporation began testing 1500 CORNING® N20, ½ watt, 1% resistors in a 40°C ambient under various power stressing conditions. Resistance deviations resulting from this program were minimal

and unsurpassed in the industry. To confirm the stability characteristics demonstrated in the Remington Rand Univac test, Corning remounted 600 of the original resistors in an uncontrolled 25°C ambient early in 1962, accumulating over 180,000

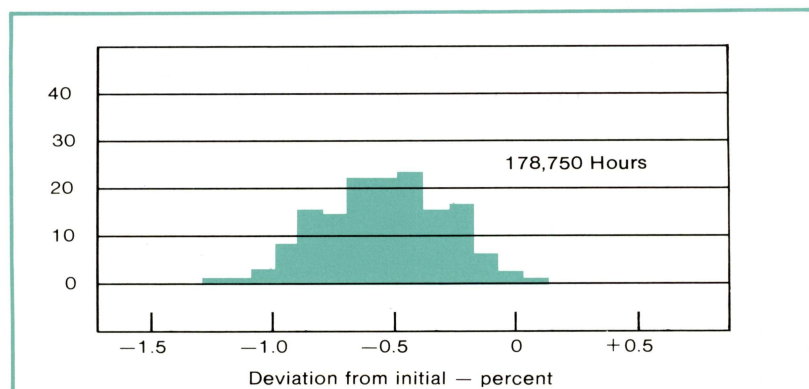
total test hours to date. Not a single unit has exceeded a 2% ΔR from initial resistance at time zero. The results of this added testing are shown below and will be of great value in evaluating CORNING metal film resistors for your circuit requirements.

Testing Procedures (Closely Simulating Typical Application)

Nominal Resistance (Ohms)	No. of Units in Group	Power Dissipation (Watts)	Percent of Rated Power	Total Test Hours To Present	Unit Hours
10,000	150	0.1	20	178,392	26,758,800
10,000	150	0.2	40	177,330	26,599,500
10,000	150	0.3	60	178,750	26,812,500
115,000	150	0.6	120	180,144	27,021,600
TOTALS	600				107,192,400



Extended Load Life Performance, CORNING Metal Film Resistors (10K, ½ Watt) at 0.3 Watt



Deviation Percentage at 0.3 Watt Dissipation for CORNING Resistors, 10K, 1% Purchase Tolerance, 150 Piece Life Test

Metal Film Resistors — Precision

(QPL to MIL-R-10509) $\pm 25\text{PPM}$ and 50PPM

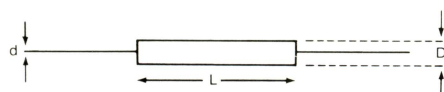
		WATTAGE RATING						Resistance Range	Standard Tolerance	Temperature Coefficient PPM/°C
Military Type	Corning Type	Military		Commercial		Voltage Rating				
		70°C	125°C	70°C	125°C					
Characteristic E ±25PPM/°C										
 RN55E	RN55E	NE55	1/10	200	1/2	1/8	250	49.9Ω-1M	.1, .25, .5, 1	25
 RN60E	RN60E	NE60	1/8	250	1	1/4	350	49.9Ω-1M	.1, .25, .5, 1	25
 RN65E	RN65E	ME65	1/4	300	1	1/2	350	49.9Ω-1M	.1, .25, .5, 1	25

Characteristic C $\pm 50\text{PPM}/^{\circ}\text{C}$

 RN50C	RN50C	NC3	$\frac{1}{20}$	200	$\frac{1}{8}$			49.9 Ω -100K	.5, 1	50
 RN55C	RN55C	NC55	$\frac{1}{10}$	200	$\frac{1}{2}$	$\frac{1}{8}$	250	49.9 Ω -1M	.1, .25, .5, 1	50
 RN60C	RN60C	NC60	$\frac{1}{8}$	250	1	$\frac{1}{4}$	350	49.9 Ω -1M	.1, .25, .5, 1	50
 RN65C	RN65C	MC65	$\frac{1}{4}$	300	1	$\frac{1}{2}$	350	49.9 Ω -1M	.1, .25	50
 RN65C	RN65C	NC6	$\frac{1}{4}$	300	1	$\frac{1}{2}$	350	49.9 Ω -1M	.5, 1	50
 RN70C	RN70C	NC7	$\frac{3}{4}$	350	1		500	51.1 Ω -1M	.5, 1	50

ACTUAL SIZE

Part Number Explanation on Page 23



DIMENSIONS — INCHES				DIMENSIONS — MM			
	Body L	Body D	Leads* d		Body L	Body D	Leads* d
RN55E	.245 $\pm$.030	.088 $\pm$.010	.025		6.22 $\pm$.76	2.24 $\pm$.25	.63
RN60E	.375 $\pm$.025 $\pm$.055	.135 $\pm$.020 $\pm$.000	.025		9.53 $\pm$.63 $\pm$ 1.4	3.43 $\pm$.51 $\pm$.00	.63
RN65E	.555 $\pm$.030 $\pm$.020	.178 $\pm$.010	.025		14.10 $\pm$.76 $\pm$.51	4.52 $\pm$.25	.63
RN50C	.145 $\pm$.015	.062 $\pm$.004	.016		3.68 $\pm$.38	1.57 $\pm$.10	.41
RN55C	.245 $\pm$.030	.088 $\pm$.010	.025		6.22 $\pm$.76	2.24 $\pm$.25	.63
RN60C	.375 $\pm$.025 $\pm$.055	.135 $\pm$.020 $\pm$.000	.025		9.53 $\pm$.63 $\pm$ 1.4	3.43 $\pm$.51 $\pm$.00	.63
RN65C	.555 $\pm$.030 $\pm$.020	.178 $\pm$.010	.025		14.10 $\pm$.76 $\pm$.51	4.52 $\pm$.25	.63
RN65C	.554 $\pm$.021	.190 $\pm$.010 $\pm$.015	.025		14.07 $\pm$.53	4.83 $\pm$.25 $\pm$.38	.63
RN70C	.719 $\pm$.031	.248 $\pm$.015	.032		18.26 $\pm$.79	6.30 $\pm$.38	.81

*All leads are 1.5" $\pm$.125" long. (38.1 $\pm$ 3.2 mm.)

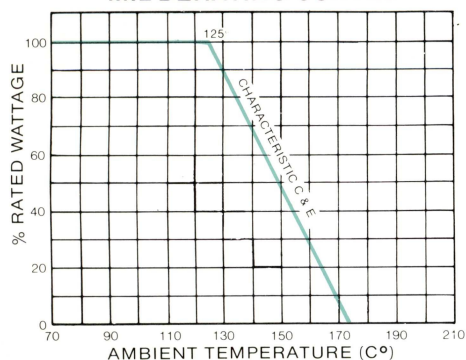
Corning's ± 25 and ± 50 ppm resistors provide the tight tolerance, tight temperature coefficient and operating stability required in today's precision circuits. These resistors feature the

low noise and low inductance characteristics of metal film technology. Standard resistance tolerances are 0.1, .25, .5, and 1%.

Load Life 1000 Hours MIL Rating ΔR Max. $\pm\%$	Moisture Resistance ΔR Max. $\pm\%$	Thermal Shock ΔR Max. $\pm\%$	Short Time Overload ΔR Max. $\pm\%$	Low Temp. Operation ΔR Max. $\pm\%$	D.W.V. ΔR Max. $\pm\%$	Effect Solder Heat ΔR Max. $\pm\%$	Terminal Strength ΔR Max. $\pm\%$	Shock ΔR Max. $\pm\%$	Vibration ΔR Max. $\pm\%$
0.5	0.5	0.10	0.10	0.10	0.05	0.1	0.05	0.05	0.05
0.5	0.5	0.10	0.10	0.10	0.05	0.1	0.05	0.05	0.05
0.5	0.5	0.10	0.10	0.10	0.05	0.1	0.05	0.05	0.05
0.5	0.5	0.25	0.10	0.10	0.05	0.1	0.05	0.05	0.05
0.5	0.5	0.10	0.10	0.10	0.05	0.1	0.05	0.05	0.05
0.5	0.5	0.10	0.10	0.10	0.05	0.1	0.05	0.05	0.05
0.5	0.5	0.10	0.10	0.10	0.05	0.1	0.05	0.05	0.05
0.5 ⁽¹⁾	0.5	0.25	0.10	0.10	0.05	0.1	0.05	0.05	0.05
0.5 ⁽¹⁾	0.5	0.25	0.10	0.10	0.05	0.1	0.05	0.05	0.05

⁽¹⁾ 1 Watt Commercial
 $\Delta R \pm 1.0\%$

MIL DERATING CURVES



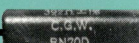
Part Marking Examples, Insulating Coatings, Color, Lead Materials and Other Information Available on Page 9.

Metal Film Resistors—Precision

RN55D, RN60D, RN65D, RN70D (QPL to MIL-R-10509) ± 100 PPM

Precision metal film resistors for all circuit applications. Specifications meet or exceed those of MIL-R-10509. These resistors feature low noise and low inductance characteristics.

MIL-R-10509 specifies +200, -500-PPM/ $^{\circ}$ C as the temperature coefficient for D characteristic. Corning guarantees ± 100 PPM/ $^{\circ}$ C temperature coefficient.

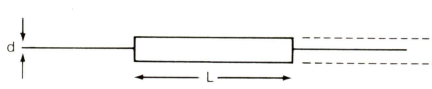
	Military Type	Corning Type	WATTAGE RATING						Resistance Range	Standard Tolerance	Temperature Coefficient PPM/°C
			Military			Commerical					
			70°C	125°C	Voltage Rating	70°C	125°C	Voltage Rating			
Characteristic D ±100PPM/°C											
 RN55D	RN55D	NA55	1/8		200	1/4	1/8	250	49.9Ω-150K 10Ω-301K	.5 1	100
 RN60D	RN60D	NA60	1/4		300	1/2	1/4	350	49.9Ω-499K 10Ω-1M	.5 1	100
 RN65D	RN65D	NA65	1/2	1/4	350	1	1/2	350	49.9Ω-1M 10Ω-2M	.5 1	100
 RN70D	RN70D	NA70	3/4		500	1	1/2	500	51.1Ω-1M	.5, 1	100
Actual Size											

Actual Size

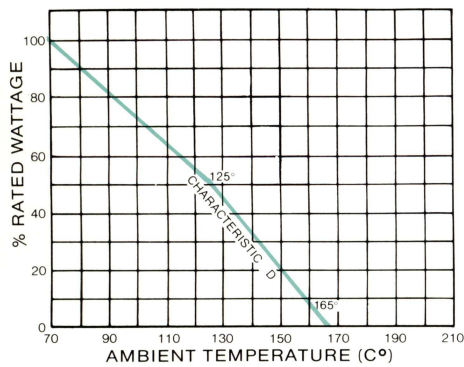
Part Number Explanation on Page 23

DIMENSIONS — INCHES				DIMENSIONS — MM			
	L	Body D	Leads* d		L	Body D	Leads* d
RN55D	.225 $\pm$.020	.090 $\pm$.008	.025		5.71 $\pm$.51	2.29 $\pm$.20	.63
RN60D	.355 $\pm$.020	.148 $\begin{smallmatrix} +.000 \\ -.023 \end{smallmatrix}$	.025		9.00 $\pm$.51	3.76 $\begin{smallmatrix} +.000 \\ -.58 \end{smallmatrix}$	.63
RN65D	.554 $\pm$.021	.190 $\begin{smallmatrix} +.010 \\ -.015 \end{smallmatrix}$	.025		14.07 $\pm$.53	4.83 $\begin{smallmatrix} +.25 \\ -.38 \end{smallmatrix}$	.63
RN70D	.719 $\pm$.031	.248 $\pm$.015	.032		18.26 $\pm$.79	6.30 $\pm$.38	.81

*All leads are 1.5" $\pm$.125" long (38.1 $\pm$ 3.2mm).



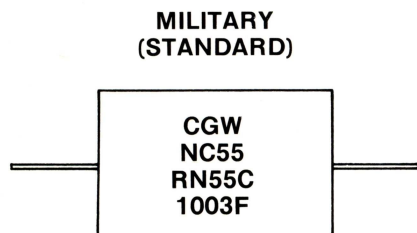
MIL DERATING CURVES



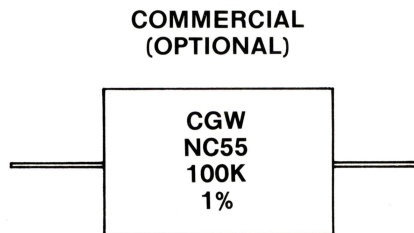
Load Life 1000 Hours MIL Rating ΔR Max. ±%	Moisture Resistance ΔR Max. ±%	Thermal Shock ΔR Max. ±%	Short Time Overload ΔR Max. ±%	Low Temp. Operation ΔR Max. ±%	D.W.V. ΔR Max. ±%	Effect Solder Heat ΔR Max. ±%	Terminal Strength ΔR Max. ±%	Shock ΔR Max. ±%	Vibration ΔR Max. ±%
0.5 1.0 ⁽¹⁾	0.5	0.25	0.1	0.1	0.05	0.1	0.05	0.05	0.05
0.5 1.0 ⁽¹⁾	0.5	0.25	0.1	0.1	0.05	0.1	0.05	0.05	0.05
0.5 1.0 ⁽¹⁾	0.5	0.25	0.1	0.1	0.05	0.1	0.05	0.05	0.05
0.5 1.0 ⁽¹⁾	0.5	0.25	0.1	0.1	0.05	0.1	0.05	0.05	0.05

⁽¹⁾Commercial Load Life Rating.

PART MARKING EXAMPLES



CGW — Corning Glass Works
NC55 — Style and Case Size
RN55C — MIL Designation
1003F — Value & tolerance



CGW — Corning Glass Works
NC55 — Style and Case Size
100K — Value in ohms
1% — Tolerance

OTHER MARKING AVAILABLE — Customer part number; color banding.

INSULATING COATING — ME65 and MC65 are molded silicone. All others are conformally coated with epoxy resin.

COLOR — Dark gray or green.

LEAD MATERIAL — Type C, per MIL-STD-1276 (weldable types available).

OTHER INFORMATION AVAILABLE — Frequency characteristics, inductance, noise.

Metal Film Resistors — Semi-Precision

RLR05C, 07C, 20C, 32C (QPL to MIL-R-39017) Established Reliability

MIL-R-39017 is the established reliability specification for semi-precision metal film resistors. It supersedes MIL-R-22684 which is now inactive for new design.

Revision C of MIL-R-39017 changed the temperature coefficient from $\pm 200\text{PPM}/^\circ\text{C}$ to $\pm 100\text{PPM}/^\circ\text{C}$ and added $\pm 1\%$ purchase tolerance. Resistance value coding was changed from three digit to four digit for $\pm 1\%$ and $\pm 2\%$ tolerance.

Amendment 2 to MIL-R-39017 makes all $\pm 5\%$ tolerance parts and $\pm 2\%$ parts with 3 digit resistance coding *inactive for new design*. However, usage of these devices is permitted in many existing designs.

New designs should use either $\pm 1\%$ or $\pm 2\%$ tolerance parts with four digit resistance value coding and marking.

Extended life tests of over one-half billion unit test hours have proven the reliability

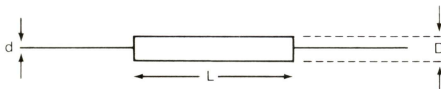
inherent in Corning's manufacturing process. This has been confirmed by field performance in high reliability programs such as: Minuteman, Safeguard, Mercury, Gemini, Apollo, Mariner, and Poseidon, as well as our involvement in virtually every other military program requiring resistors.

	Military Type	Corning Type	Wattage 70°C	Voltage Rating	Resistance Range	Standard ⁽¹⁾ Tolerance	Temperature Coefficient PPM/°C	Load Life 2000 Hours MIL Rating ΔR Max. $\pm\%$
 RLR05	RLR05C	HC3	$\frac{1}{8}$	200	10Ω-150K	1, 2, 5%	100	1.0
 RLR07	RLR07C	HC4	$\frac{1}{4}$	250	10Ω-300K	1, 2, 5%	100	1.0
 RLR20	RLR20C	HC5	$\frac{1}{2}$	350	10Ω-1M	1, 2, 5%	100	1.0
 RLR32	RLR32C	HC6	1	500	10Ω-1M	1, 2, 5%	100	2.0

ACTUAL SIZE

(1) 5% tolerance is inactive for new design.

Part Number Explanation on Page 23



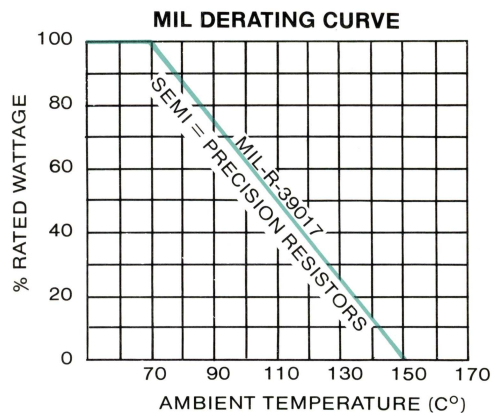
*All leads are $1.5'' \pm .125''$ long unless otherwise noted. ($38.1 \pm 3.2\text{mm}$).

**Leads are $1.25'' \pm .266''$ long ($31.8 \pm 6.8\text{mm}$).

	DIMENSIONS — INCHES			DIMENSIONS — MM		
	L	Body D	Leads* d	L	Body D	Leads* d
RLR05C	$.145 \pm .015$	$.062 \pm .004$	.016**	$3.68 \pm .38$	$1.57 \pm .10$	.41**
RLR07C	$.225 \pm .020$	$.090 \pm .008$	.025	$5.71 \pm .51$	$2.29 \pm .20$	.63
RLR20C	$.355 \pm .020$	$1.48 \pm .000$ $-.023$	.032	$9.02 \pm .51$	$3.76 \pm .000$ $-.58$	.81
RLR32C	$.554 \pm .026$ $-.021$	$.190 \pm .010$ $-.015$	.040	$14.07 \pm .66$ $-.53$	$4.83 \pm .25$ $-.38$	1.02

Life failure rate level (established at 60-percent confidence)

Failure-rate-level designation	Failure-rate percent/1,000 hours
M	1.0
P	0.1
R	0.01
S	0.001



MIL-R-39017

INSULATING COATING — Epoxy.

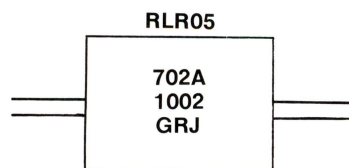
COLOR — Dark gray or green.

LEAD MATERIAL — Type C, per MIL-STD-1276 (weldable types available).

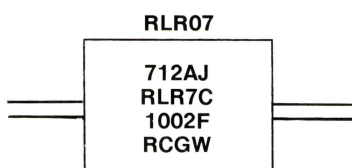
OTHER INFORMATION AVAILABLE — Frequency characteristics, noise, inductance and failure rate levels.

Moisture Resistance ΔR Max. $\pm\%$	Thermal Shock ΔR Max. $\pm\%$	Low Temp. Storage ΔR Max. $\pm\%$	Low Temp. Operation ΔR Max. $\pm\%$	Short Time Overload ΔR Max. $\pm\%$	D.W.V. ΔR Max. $\pm\%$	Effect Solder Heat ΔR Max. $\pm\%$	Terminal Strength ΔR Max. $\pm\%$	Shock & Vibration ΔR Max. $\pm\%$	Power Conditioning ΔR Max. $\pm\%$
.5	.25	0.1	0.1	.5	0.05	.1	0.05	0.05	.5
.5	.25	0.1	0.1	.5	0.05	.1	0.05	0.05	.5
.5	.25	0.1	0.1	.25	0.05	.1	0.05	0.05	.5
.5	.25	.25	.25	.25	.1	.1	.1	.1	.5

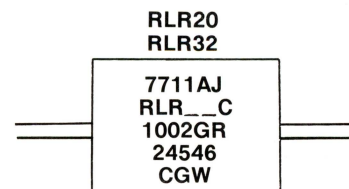
PART MARKING EXAMPLES



702A — Year, Week of Year, Lot Code
1002 — Coded Resistance Value*
GRJ — Tol., FR, JAN



712AJ — Year, Week of Year, Lot Code, JAN
RLR7C — Style, Lead Material
1002F — Coded Resistance Value*, Tol.
RCGW — FR, Corning Glass Works



7711AJ — Year, Week of Year, Lot Code, JAN
RLR__C — Style, Lead Material
1002GR — Coded Resistance Value*, Tol., FR
24546 — Source Code
CGW — Corning Glass Works

* $\pm 5\%$ tolerance parts are marked with 3 digit resistance value code, e.g. 103. $\pm 2\%$ tolerance parts are marked with 4 digit code but may be special ordered with 3 digit code. All $\pm 5\%$ parts and $\pm 2\%$ parts with 3 digit coding are inactive for new design.

Molded Metal Film Resistors—Precision

(QPL to Established Reliability MIL-R-55182)

RNC50J/H/K, RNC55J/H/K, RNC60J/H/K, RNC65J/H/K, FR Level S
RNR50J/H/K, RNR55J/H/K, RNR60J/H/K, RNR65J/H/K, FR Level S

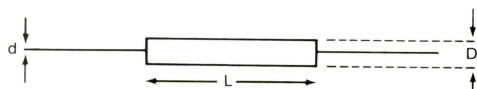
CORNING® RNC resistors are designed for the many military applications where established reliability is a must.

Extended life tests of over one hundred million unit test hours have proven the reliability inherent in Corning's manufacturing process.

	WATTAGE RATING								Load Life 2000 Hours MIL Rating ΔR Max. ±%
	Military Type	Corning Type	Military			Resistance Range	Standard Tolerance	Temperature Coefficient PPM/°C	
70°C			125°C	Voltage Rating					
 RNC50	RNC50J/ RNR50J	MJ50	1/10	1/20	200	49.9Ω-150K	.1, .5, 1%	25	0.5
	RNC50H/ RNR50H	MH50	1/10	1/20	200	10Ω-48.7Ω 49.9Ω-150K	.5, 1% .1, .5, 1%	50	
	RNC50K/ RNR50K	MK50	1/10	1/20	200	10Ω-150K	.5, 1%	100	
 RNC55	RNC55H/ RNR55H	MH55	1/8	1/10	200	10Ω-48.7Ω	.5, 1%	50	0.5
	RNC55K/ RNR55K	MK55	1/8	1/10	200	10Ω-48.7Ω	.5, 1%	100	
	RNC55J/ RNR55J	CJ55	1/8	1/10	200	49.9Ω-301K	.1, .5, 1%	25	
 RNC55	RNC55H/ RNR55H	CH55	1/8	1/10	200	49.9Ω-301K	.1, .5, 1%	50	0.5
	RNC55K/ RNR55K	CK55	1/8	1/10	200	49.9Ω-301K	.5, 1%	100	
	 RNC60	RNC60H/ RNR60H	MH60	1/4	1/8	250	10Ω-48.7Ω	.5, 1%	50	0.5
RNC60K/ RNR60K		MK60	1/4	1/8	250	10Ω-48.7Ω	.5, 1%	100	
RNC60J/ RNR60J		CJ60	1/4	1/8	250	49.9Ω-499K	.1, .5, 1%	25	
 RNC60	RNC60H/ RNR60H	CH60	1/4	1/8	250	49.9Ω-499K	.1, .5, 1%	50	0.5
	RNC60K/ RNR60K	CK60	1/4	1/8	250	49.9Ω-499K	.5, 1%	100	
	 RNC65 ACTUAL SIZE	RNC65J/ RNR65J	MJ65	1/2	1/4	300	49.9Ω-1M	.1, .5, 1%	25	0.5
RNC65H/ RNR65H		MH65	1/2	1/4	300	10Ω-48.7Ω 49.9Ω-1M	.5, 1% .1, .5, 1%	50	
RNC65K/ RNR65K		MK65	1/2	1/4	300	10Ω-48.7Ω 49.9Ω-1M	.5, 1% .1, .5, 1%	100	

ACTUAL SIZE

Part Number Explanation
on Page 23



*All leads are 1.5"
± .125" long
(38.1 ± 3.2 mm)

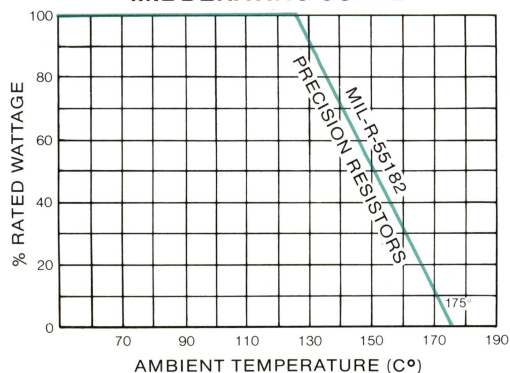
(1) J, H or K
(2) H or K

	DIMENSIONS — INCHES			DIMENSIONS — MM		
	L	Body D	Leads* d	L	Body D	Leads* d
M ⁽¹⁾ 50	.160 ± .010	.075 ± .005	.016	4.06 ± .25	1.9 ± .13	.41
M ⁽²⁾ 55	.270 ± .010	.098 + .002 - .003	.025	6.86 ± .25	2.49 + .051 - .076	.63
C ⁽¹⁾ 55	.245 ± .030	.090 + .008 - .005	.025	6.22 ± .76	2.29 + .20 - .13	.63
M ⁽²⁾ 60	.410 ± .015	.160 ± .005	.025	10.41 ± .38	4.06 ± .13	.63
C ⁽¹⁾ 60	.375 + .025 - .055	.135 + .020 - .000	.025	9.53 + .63 - 1.4	3.43 + .51 - .00	.63
M ⁽¹⁾ 65	.555 + .030 - .020	.178 ± .010	.025	14.1 + .76 - .51	4.5 ± .25	.63

Life failure rate level (established at 60-percent confidence)

Failure-rate-level designation	Failure-rate percent/1,000 hours
M	1.0
P	0.1
R	0.01
S	0.001

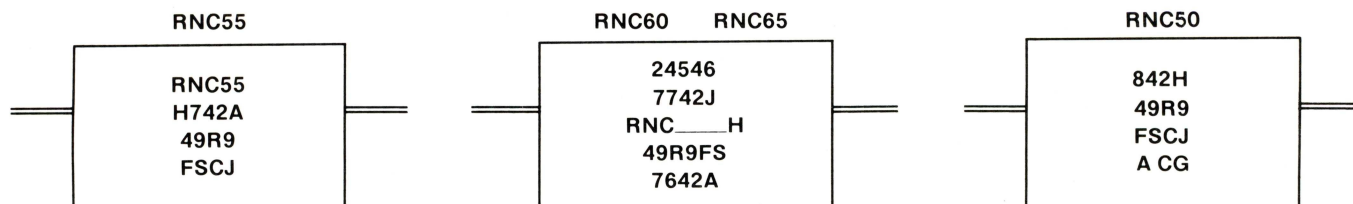
MIL DERATING CURVE



CORNING

Moisture Resistance ΔR Max. $\pm\%$	Overload and Thermal Shock ΔR Max. $\pm\%$	Low Temp. Operation ΔR Max. $\pm\%$	D.W.V. ΔR Max. $\pm\%$	Effect Solder Heat ΔR Max. $\pm\%$	Terminal Strength ΔR Max. $\pm\%$	Shock ΔR Max. $\pm\%$	Vibration ΔR Max. $\pm\%$	High Temp. Exposure ΔR Max. $\pm\%$
0.4	0.2	0.15	0.15	0.1	0.2	0.2	0.2	0.5
0.4	0.2	0.1	0.1	0.1	0.05	0.05	0.05	0.5
0.4	0.2	0.1	0.1	0.1	0.05	0.05	0.05	0.5
0.4	0.2	0.1	0.1	0.1	0.05	0.05	0.05	0.5
0.4	0.2	0.1	0.1	0.1	0.05	0.05	0.05	0.5
0.4	0.2	0.1	0.1	0.1	0.05	0.05	0.05	0.5

PART MARKING EXAMPLES



RNC55 — Style and Terminal
H742A — Char., Date Code, Prod. Lot Code
49R9 — Value
FSCJ — Tol., FR, Term., and JAN

24546 — Source Code
7742J — Date Code and JAN
RNC__H — Style, Term, (60/65), and Char.
49R9FS — Value, Tol, and FR
7642A — Production Lot Code

842H — Date Code, Characteristic
49R9 — Value
FSCJ — Tol, FR, Term., and JAN
A CG — Lot Code — Manuf. Ident.

MIL-R-55182

INSULATING COATING — Molded Silicone or conformal.

COLOR Dark gray.

LEAD MATERIAL — Type C, per MIL-STD-1276 and type R.

Metal Film Resistors – Semi-Precision

C3, C4, C5, C6 (Commercial) RL07, 20, 32, (QPL to MIL-R-22684)

C05, C07, CS20, FP32, 42 (Commercial) RL07, 20, 32, 42 (QPL to MIL-R-22684)

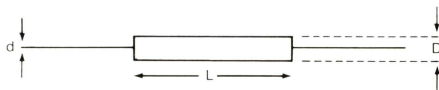
Corning's Semi-Precision Resistors offer • Long Term Stability • Low Inductance • Low Noise • Low Cost • QPL to MIL-R-22684

Ideal for preamplifiers, RF and IF circuits, and other general purpose usage.

		WATTAGE RATING						Resistance Range	Standard Tolerance	Temperature Coefficient PPM/°C
Military Type	Corning Type	Military			Commercial					
		70°C	125°C	Voltage Rating	70°C	125°C	Voltage Rating			
Temperature Coefficient ±100PPM/°C Standard Tolerance 1, 2, 5%										
	C3	—			1/8	1/10	200	10Ω-150K	1, 2, 5%	100
	RL07S C4		1/4	250		1/8	250	10Ω-301K	1, 2, 5%	100
	RL20S C5		1/2	350		1/4	350	10Ω-1M	1, 2, 5%	100
	RL32S C6		1	500		1/2	500	10Ω-2M	1, 2, 5%	100
Temperature Coefficient ±200PPM/°C Standard Tolerance 2, 5, 10%										
	C05	—			1/8		200	10Ω-150K	2, 5, 10%	200
	RL07S C07		1/4	250				10Ω-301K	2, 5, 10%	200
	RL20S CS20		1/2	350				10Ω-1M	2, 5, 10%	200
	RL32S FP32		1	500				10Ω-1M	2, 5, 10%	200
	RL42S ⁽¹⁾ FP42		2	500				10Ω-1.5M	2, 5, 10%	200
ACTUAL SIZE										

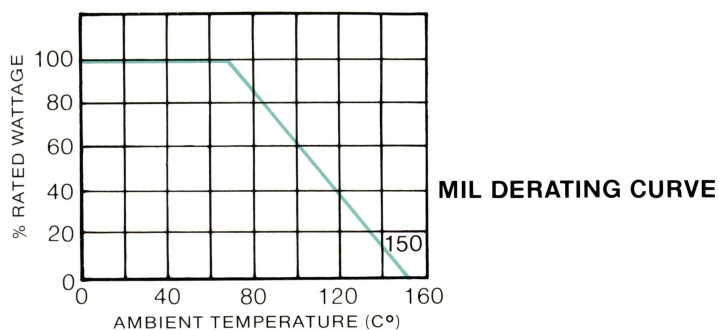
(1) Available in RL42TX.

Part Number Explanation on Page 23



* All leads are 1.5" ± .125" lg. (38.1 ± 3.2mm)
** .020" also available.

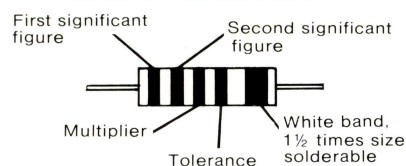
	DIMENSIONS — INCHES				DIMENSIONS — MM			
	L	Body D	Leads* d		L	Body D	Leads* d	
C3	.145 ± .015	.062 ± .004	.016**		3.68 ± .38	1.57 ± .10	.41**	
RL07S	.225 ± .020	.090 ± .008	.025		5.71 ± .51	2.29 ± .20	.63	
RL20S	.355 ± .020	.148 ^{+.000} _{-.023}	.032		9.02 ± .51	3.76 ^{+.00} _{-.58}	.81	
RL32S	.554 ± .021	.190 ^{+.010} _{-.015}	.040		14.07 ± .53	4.83 ^{+.25} _{-.38}	1.02	
C05	.145 ± .015	.062 ± .004	.016		3.68 ± .38	1.57 ± .10	.41	
RL07S	.225 ± .020	.090 ± .008	.025		5.71 ± .51	2.29 ± .20	.63	
RL20S	.355 ± .020	.148 ^{+.000} _{-.023}	.032		9.02 ± .51	3.76 ^{+.00} _{-.58}	.81	
RL32S	.560 ± .030	.190 ^{+.010} _{-.015}	.040		14.27 ± .76	4.83 ^{+.25} _{-.38}	1.02	
RL42S	.687 ± .031	.310 ± .010	.045		17.45 ± .79	8.00 ± .25	1.14	



Load Life 1000 Hours MIL Rating ∠ R Max. ±%	Moisture Resistance ∠ R Max. ±%	Thermal Shock ∠ R Max. ±%	Short Time Overload ∠ R Max. ±%	Low Temp. Operation ∠ R Max. ±%	D.W.V. ∠ R Max. ±%	Effect Solder Heat ∠ R Max. ±%	Terminal Strength ∠ R Max. ±%	Shock ∠ R Max. ±%	Vibration ∠ R Max. ±%
1.0	0.5	0.25	0.5	0.25	0.1	0.1	0.2	0.1	0.1
1.0	0.5	0.25	0.25	0.25	0.1	0.1	0.1	0.1	0.1
1.0	0.5	0.25	0.25	0.5	0.1	0.1	0.1	0.1	0.1
2.0	0.5	0.25	0.25	0.5	0.1	0.1	0.1	0.1	0.1
1.0	0.5	0.25	0.5	0.25	0.1	0.1	0.2	0.1	0.1
2.0	0.5	0.25	0.5	0.25	0.1	0.1	0.1	0.1	0.1
1.5	1.5	1.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5
2.0	1.5	1.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5
3.0	1.0	1.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5

PART MARKING EXAMPLES

MILITARY

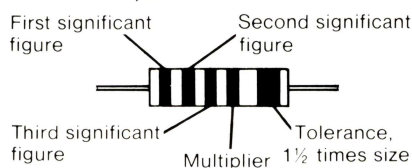


5 Band, MIL-R-22684

COLOR CODE — For color code explanation see page 22.

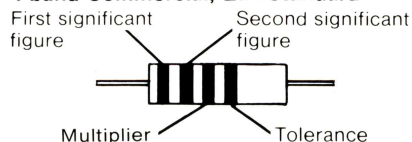
COMMERCIAL

1% Tolerance Parts are marked with 5 color bands. 5 band, EIA Standard RS 196*.



2, 5 & 10% Tolerance Parts are marked with 4 color bands.

4 band Commercial, EIA Standard



OTHER MARKING AVAILABLE — Type marking.

INSULATING COATING — Epoxy resin for "C" styles, flameproof ceramic for "FP" styles.

COLOR — Dark gray or green for "C" styles, medium blue for "FP" styles.

LEAD MATERIAL — Type C, per MIL-STD-1276 (weldable types available).

OTHER INFORMATION AVAILABLE — Frequency characteristics, inductance, noise.

*C3, 1% tolerance part is typemarked.

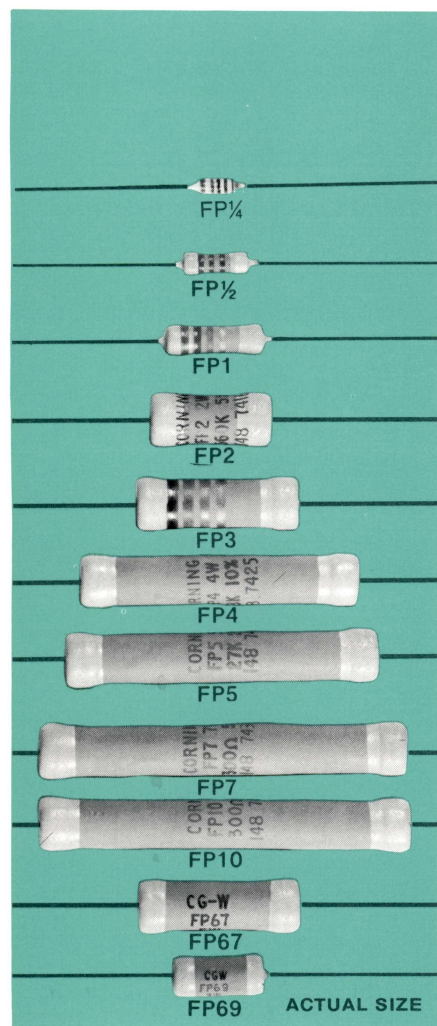
† Metal Film Resistors—Flameproof

FP¼, ½, 1, 2, 3, 4, 5, 7, 10, 67, 69 Commercial Flameproof

CORNING® FP Style Resistors are especially suited for circuitry where functions, environments and duty

cycles demand small, low-power resistors with exceptional frequency characteristics, low end cost and the

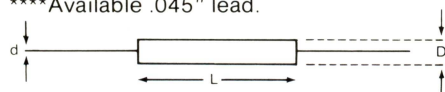
ability to withstand overloads up to 100 times rated power without any trace of flame.



Corning Type	Wattage Rating			Voltage Rating	Resistance Range	Standard Tolerance	Temperature Coefficient PPM/°C
	25°C	40°C	70°C				
FP¼	—	—	¼	250	10Ω-301K	1, 2, 5, 10%	200 ⁽¹⁾
FP½	—	—	½	350	10Ω-1M	1, 2, 5, 10%	150
FP1	—	—	1	500	10Ω-1M	1, 2, 5, 10%	150
FP2	3½	3	2	500	9Ω-1.5M	1, 2, 5, 10%	200
FP3	4	4	3	500	9Ω-125K	1, 2, 5, 10%	200
FP4	5½	5	4	500	16Ω-125K	1, 2, 5, 10%	200
FP5	6½	6	5	600	19Ω-125K	1, 2, 5, 10%	200
FP7	7½	—	7	700	24Ω-125K	1, 2, 5, 10%	200
FP10	—	10	—	700	24Ω-125K	1, 2, 5, 10%	200
FP67	5	—	—	500	5Ω-19K	1, 2, 5, 10%	200
FP69	3	—	2	350	2.6Ω-1M	1, 2, 5, 10%	200

Part Number Explanation on Page 23

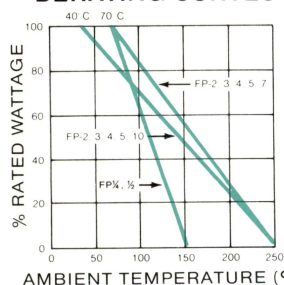
*All leads are 1.5" ± .125 long. (38.1 ± 3.2mm)
 **Clean lead to clean lead.
 ***Available .040" lead.
 ****Available .045" lead.



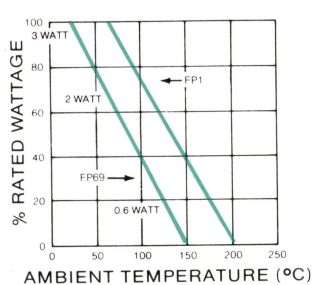
† Not available through distribution.
 (1) Available in ±100PPM/°C.

	DIMENSIONS — INCHES				DIMENSIONS — MM			
	L	Body D	Leads* d		L	Body D	Leads* d	
FP¼	.380 Max.**	.088 ± .008	.025		9.65 Max.**	2.23 ± .20	.63	
FP½	.416 Max.** .360 ± .020	.138 ± .012 — .023	.032		10.57 Max.** 9.14 ± .51	3.51 ± .30 — .58	.81	
FP1	.560 ± .031	.190 ± .010 — .015	.032***		14.22 ± .79	4.83 ± .25 — .38	.81***	
FP2	.687 ± .031	.310 ± .010	.032****		17.45 ± .79	7.87 ± .25	.81****	
FP3	.900 ± .055	.310 ± .010	.032		22.86 ± 1.40	7.87 ± .25	.81	
FP4	1.530 ± .035	.310 ± .010	.032		38.86 ± .89	7.87 ± .25	.81	
FP5	1.710 ± .035	.310 ± .010	.032		43.43 ± .89	7.87 ± .25	.81	
FP7	2.040 ± .035	.310 ± .010	.032		51.82 ± .89	7.87 ± .25	.81	
FP10	2.040 ± .035	.310 ± .010	.032		51.82 ± .89	7.87 ± .25	.81	
FP67	.900 ± .055	.310 ± .010	.032		22.86 ± 1.40	7.87 ± .25	.81	
FP69	.516 ± .021	.225 ± .012	.032		13.11 ± .53	5.71 ± .30	.81	

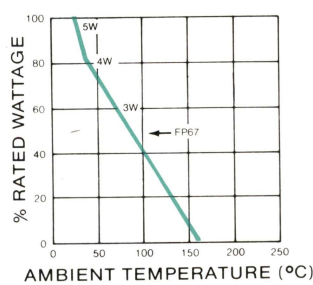
DERATING CURVES



DERATING CURVES

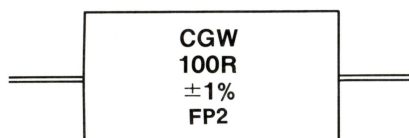


DERATING CURVE



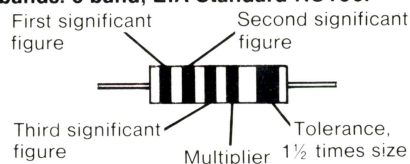
Load Life 1000 Hours Rated Cond. ∠R Max. ±%	Moisture Resistance ∠R Max. ±%	Temp. Cycle ∠R Max. ±%	Short Time Overload ∠R Max. ±%	Low Temp. Operation ∠R Max. ±%	D.W.V. ∠R Max. ±%	Effect Solder Heat ∠R Max. ±%	Terminal Strength ∠R Max. ±%	Shock ∠R Max. ±%	Vibration ∠R Max. ±%
1.0	1.0	0.5	0.5	0.5	0.5	0.25	0.25	0.5	0.5
1.0	1.0	1.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5
2.0	1.5	1.0	1.0	0.5	0.5	0.5	0.5	0.5	0.5
5.0	1.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
5.0	1.0	1.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5
5.0	1.0	1.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5
5.0	1.0	1.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5
5.0	1.0	1.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5
5.0	1.0	1.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5
5.0	1.0	1.0	0.5	0.25	0.25	0.25	0.25	0.5	0.5
3.0	1.0	0.5	0.5	0.25	0.25	0.25	0.5	0.5	0.5

PART MARKING EXAMPLES

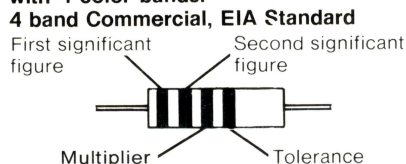


CGW — Corning Glass Works
100R — Value in ohms
±1% — Tolerance
FP2 — Style and Case Size
(Date and source code
included on some styles)

1% Tolerance Parts are marked with 5 color bands. 5 band, EIA Standard RS196.



2, 5 & 10% Tolerance Parts are marked with 4 color bands. 4 band Commercial, EIA Standard



INSULATING COATING —

Flameproof ceramic

COLOR — Medium blue.

LEAD MATERIAL — Type C, per MIL-STD-1276 (weldable types available).

OTHER INFORMATION AVAILABLE — Frequency characteristics, inductance, noise.

COLOR CODE — For color code explanation see page 22.

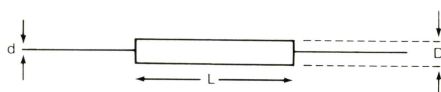
† Metal Film Resistors—Precision Flameproof

FP55E, FP60E, FP55C, FP60C, FP55, FP60

These flameproof resistors are especially suited for tight tolerance and tight temperature coefficient circuit applications.

	Corning Type	Wattage Rating 70°C	Voltage Rating	Resistance Range	Standard Tolerance	Temperature Coefficient PPM/°C
Characteristic E ± 25 PPM/°C						
 FP55E	FP55E	$\frac{1}{4}$	200	49.9 Ω -200K	.1, .25, .5, 1%	25
 FP60E	FP60E	$\frac{1}{2}$	250	49.9 Ω -511K	.1, .25, .5, 1%	25
Characteristic C ± 50 PPM/°C						
 FP55C	FP55C	$\frac{1}{4}$	200	49.9 Ω -200K	.1, .25, .5, 1%	50
 FP60C	FP60C	$\frac{1}{2}$	250	49.9 Ω -511K	.1, .25, .5, 1%	50
± 100 PPM/°C						
 FP55	FP55	$\frac{1}{4}$	250	10 Ω -301K	1, 2, 5, 10%	100
 FP60 ACTUAL SIZE	FP60	$\frac{1}{2}$	350	10 Ω -1M	1, 2, 5, 10%	100

Part Number Explanation on Page 23



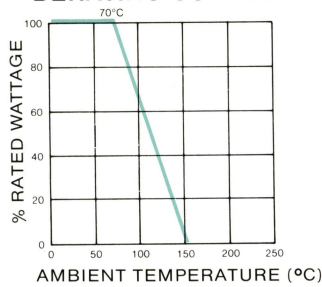
*All leads are 1.5" $\pm$.125" long.
(38.1 $\pm$ 3.2 mm)

**Clean lead to clean lead.

DIMENSIONS — INCHES				DIMENSIONS — MM			
	L	Body D	Leads* d		L	Body D	Leads* d
FP55E	0.380 Max.**	.100 Max.	.025		9.65 Max.**	2.54 Max.	.63
FP60E	.350 $\pm$.030	.130 $\pm$.015 — .025	.025		8.89 $\pm$.76	3.30 $\pm$.38 — .63	.63
FP55C	0.380 Max.**	.100 Max.	.025		9.65 Max.**	2.54 Max.	.63
FP60C	.350 $\pm$.030	.130 $\pm$.015 — .025	.025		8.89 $\pm$.76	3.30 $\pm$.38 — .63	.63
FP55	.225 $\pm$.020	.090 $\pm$.008	.025		5.72 $\pm$.51	2.29 $\pm$.20	.63
FP60	.355 $\pm$.020	.148 $\pm$.000 — .023	.032		9.02 $\pm$.51	3.76 $\pm$.00 — .58	.81

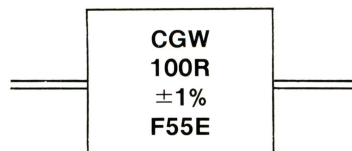
† Not available through distribution.

DERATING CURVES

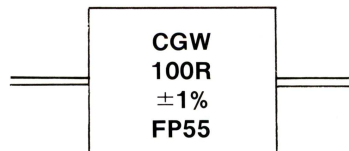


Load Life 1000 Hours MIL Rating Δ R Max. ±%	Moisture Resistance Δ R Max. ±%	Thermal Shock Δ R Max. ±%	Short Time Overload Δ R Max. ±%	Low Temp. Operation Δ R Max. ±%	D.W.V. Δ R Max. ±%	Effect Solder Heat Δ R Max. ±%	Terminal Strength Δ R Max. ±%	Shock Δ R Max. ±%	Vibration Δ R Max. ±%
.5	.5	.25	.25	.25	.1	.1	.1	.1	.1
.5	.5	.25	.25	.25	.1	.1	.1	.1	.1
.5	.5	.25	.25	.25	.1	.1	.1	.1	.1
.5	.5	.25	.25	.25	.1	.1	.1	.1	.1
1.0	1.0	.5	.5	.5	.5	.25	.25	.5	.5
1.0	1.0	.5	.5	.5	.5	.5	.5	.5	.5

PART MARKING EXAMPLES



CGW — Corning Glass Works
 100R — Value in Ohms
 ±1% — Tolerance
 F55E — Style, Case Size
 and Temperature
 Coefficient



CGW — Corning Glass Works
 100R — Value in Ohms
 ± 1% — Tolerance
 FP55 — Style and Case Size

INSULATING COATING — Flameproof
 ceramic (FP55 and FP60 have epoxy over-
 coat.)

COLOR — Medium Blue

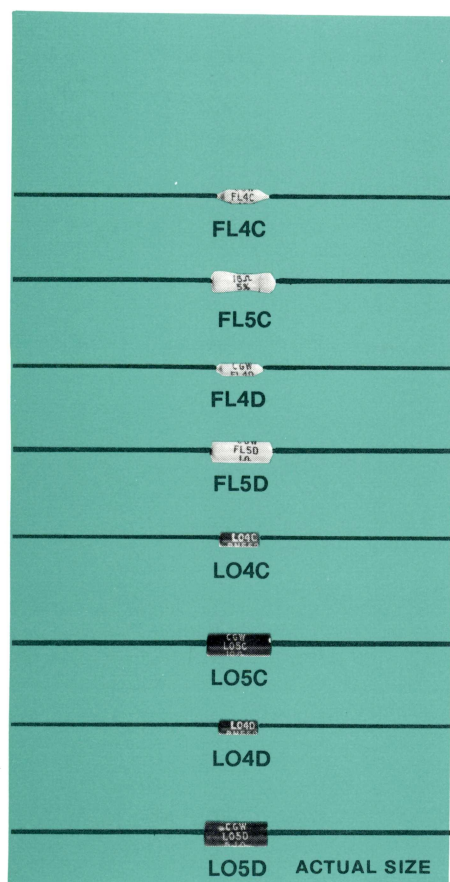
LEAD MATERIAL — Type C, per MIL-STD-
 1276 (weldable types available)

OTHER INFORMATION AVAILABLE —
 Frequency characteristics, inductance,
 noise.

† Metal Film Resistors—Low Resistance

FL4C, FL5C, FL4D, FL5D
LO4C, LO5C, LO4D, LO5D
MIL-R-10509 Equivalent ⁽¹⁾

These styles provide low value resistors in both flameproof and non-flameproof construction. Temperature coefficients as tight as 50PPM/°C are available.



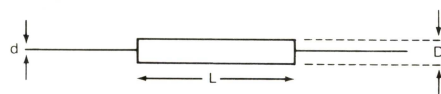
Corning Type	WATTAGE RATING						Resistance Range	Standard Tolerance	Temperature Coefficient PPM/°C
	Equiv. Military			Commercial					
	70°C	125°C	Voltage Rating	70°C	125°C	Voltage Rating			
FL4C	¼		250				1Ω-48.7Ω	1, 2, 5%	50
FL5C	½		350				1Ω-48.7Ω	1, 2, 5%	50
FL4D	¼		250				1Ω-9.76Ω	1, 2, 5%	100
FL5D	½		350				1Ω-9.76Ω	1, 2, 5%	100
LO4C	⅙	⅒	200	¼		200	1Ω-48.7Ω	1, 2, 5%	50
LO5C	¼	⅙	350	½		350	1Ω-48.7Ω	1, 2, 5%	50
LO4D	⅙	⅒	200	¼		200	1Ω-9.76Ω	1, 2, 5%	100
LO5D	¼	⅙	350	½		350	1Ω-9.76Ω	1, 2, 5%	100

(1) For MIL-R-10509 equivalent product requirements below QPL resistance values.

Part Number Explanation on Page 23

*All leads are 1.5" ± .125" long (38.1 ± 3.2 mm).

**Clean lead to clean lead.

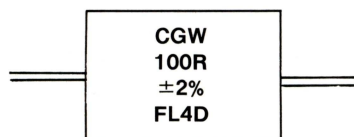


† Not available through distribution.

	DIMENSIONS — INCHES				DIMENSIONS — MM			
	L	Body D	Leads* d		L	Body D	Leads* d	
FL4C	.380 Max.**	.088 ± .010	.025		9.65 Max.**	2.24 ± .25	.63	
FL5C	.350 ± .030	.130 ± .015 — .025	.032		8.89 ± .76	3.30 ± .38 — .63	.81	
FL4D	.380 Max.**	.088 ± .010	.025		9.65 Max.**	2.24 ± .25	.63	
FL5D	.350 ± .030	.130 ± .015 — .025	.032		8.89 ± .76	3.30 ± .38 — .63	.81	
LO4C	.225 ± .020	.090 ± .008	.025		5.72 ± .51	2.29 ± .20	.63	
LO5C	.355 ± .020	.148 ± .000 — .023	.032		9.02 ± .51	3.76 ± .000 — .58	.81	
LO4D	.225 ± .020	.090 ± .008	.025		5.72 ± .51	2.29 ± .20	.63	
LO5D	.355 ± .020	.148 ± .000 — .023	.032		9.02 ± .51	3.76 ± .000 — .58	.81	

Load Life 1000 Hours MIL Rating ΔR Max. $\pm\%$	Moisture Resistance ΔR Max. $\pm\%$	Thermal Shock ΔR Max. $\pm\%$	Short Time Overload ΔR Max. $\pm\%$	Low Temp. Operation ΔR Max. $\pm\%$	D.W.V. ΔR Max. $\pm\%$	Effect Solder Heat ΔR Max. $\pm\%$	Terminal Strength ΔR Max. $\pm\%$	Shock ΔR Max. $\pm\%$	Vibration ΔR Max. $\pm\%$
1.0	1.0	0.25	0.5	0.25	0.1	0.25	0.1	0.1	0.1
1.0	1.0	0.25	0.5	0.25	0.1	0.25	0.1	0.1	0.1
1.0	1.0	0.25	0.5	0.25	0.1	0.25	0.1	0.1	0.1
1.0	1.0	0.25	0.5	0.25	0.1	0.25	0.1	0.1	0.1
1.0	1.0	0.25	0.5	0.25	0.1	0.25	0.1	0.1	0.1
1.0	1.0	0.25	0.5	0.25	0.1	0.25	0.1	0.1	0.1
1.0	1.0	0.25	0.5	0.25	0.1	0.25	0.1	0.1	0.1
1.0	1.0	0.25	0.5	0.25	0.1	0.25	0.1	0.1	0.1

PART MARKING EXAMPLE



CGW — Corning Glass Works
 100R — Value in Ohms
 $\pm 2\%$ — Tolerance
 FL4D — Style, Case Size and
 Temperature Coefficient

INSULATING COATING AND COLOR

— FL is a medium blue flameproof ceramic. LO is a dark grey or green epoxy resin.

LEAD MATERIAL — Type C, per MIL-STD-1276 (weldable types available).

OTHER INFORMATION AVAILABLE

— Frequency characteristics, inductance, noise.

Metal Film Resistors

CUSTOM NON-STANDARD CAPABILITIES

Many special resistor requirements can be fulfilled by calling the Resistor Customer Engineering Department in Bradford, Pennsylvania, (814) 362-5571. Some of these "special" capabilities are:

Non-standard marking, serialization, date code

Weldable leads, gold-plated nickel and domet

Non-standard lead diameters

Packaging, see page 72.

Without addition of more sophisticated test equipment, Corning can now offer custom testing or screening such as:

100% noise sort, temperature cycle

Burn-in @ various power overload levels

Group A, B, C type tests

Customer acceptance programs

Tolerance distributions

Life test

Degradation tests

Temperature Coefficient Matching

Corning is also equipped to perform 100% non-destructive radiographic (x-ray) inspection of finished components. Characteristics that can be detected are:

Resistive element alignment

Coating voids

Foreign materials

Heterogeneities of materials.

Broken, abraded, distorted element

Details of x-ray equipment such as focal points are available upon request.

Standard Resistance Values

PURCHASE TOLERANCE

B-.1% C-.25% D-.5%	F-1%	B-.1% C-.25% D-.5%	F-1%	B-.1% C-.25% D-.5%	F-1%	B-.1% C-.25% D-.5%	F-1%	B-.1% C-.25% D-.5%	F-1%	B-.1% C-.25% D-.5%	F-1%	G-2% J-5%
10.0	10.0	14.7	14.7	21.5	21.5	31.6	31.6	46.4	46.4	68.1	68.1	10
10.1	....	14.9	....	21.8	....	32.0	....	47.0	....	69.0	....	11
10.2	10.2	15.0	15.0	22.1	22.1	32.4	32.4	47.5	47.5	69.8	69.8	12
10.4	....	15.2	....	22.3	....	32.8	....	48.1	....	70.6	....	13
10.5	10.5	15.4	15.4	22.6	22.6	33.2	33.2	48.7	48.7	71.5	71.5	15
10.6	....	15.6	....	22.9	....	33.6	....	49.3	....	72.3	....	16
10.7	10.7	15.8	15.8	23.2	23.2	34.0	34.0	49.9	49.9	73.2	73.2	18
10.9	....	16.0	....	23.4	....	34.4	....	50.5	....	74.1	....	20
11.0	11.0	16.2	16.2	23.7	23.7	34.8	34.8	51.1	51.1	75.0	75.0	22
11.1	....	16.4	....	24.0	....	35.2	....	51.7	....	75.9	....	24
11.3	11.3	16.5	16.5	24.3	24.3	35.7	35.7	52.3	52.3	76.8	76.8	27
11.4	....	16.7	....	24.6	....	36.1	....	53.0	....	77.7	....	30
11.5	11.5	16.9	16.9	24.9	24.9	36.5	36.5	53.6	53.6	78.7	78.7	33
11.7	....	17.2	....	25.2	....	37.0	....	54.2	....	79.6	....	36
11.8	11.8	17.4	17.4	25.5	25.5	37.4	37.4	54.9	54.9	80.6	80.6	39
12.0	....	17.6	....	25.8	....	37.9	....	55.6	....	81.6	....	43
12.1	12.1	17.8	17.8	26.1	26.1	38.3	38.3	56.2	56.2	82.5	82.5	47
12.3	....	18.0	....	26.4	....	38.8	....	56.9	....	83.5	....	51
12.4	12.4	18.2	18.2	26.7	26.7	39.2	39.2	57.6	57.6	84.5	84.5	56
12.6	....	18.4	....	27.1	....	39.7	....	58.3	....	85.6	....	62
12.7	12.7	18.7	18.7	27.4	27.4	40.2	40.2	59.0	59.0	86.6	86.6	68
12.9	....	18.9	....	27.7	....	40.7	....	59.7	....	87.6	....	75
13.0	13.0	19.1	19.1	28.0	28.0	41.2	41.2	60.4	60.4	88.7	88.7	82
13.2	....	19.3	....	28.4	....	41.7	....	61.2	....	89.8	....	91
13.3	13.3	19.6	19.6	28.7	28.7	42.2	42.2	61.9	61.9	90.9	90.9	
13.5	....	19.8	....	29.1	....	42.7	....	62.6	....	92.0	....	
13.7	13.7	20.0	20.0	29.4	29.4	43.2	43.2	63.4	63.4	93.1	93.1	
13.8	....	20.3	....	29.8	....	43.7	....	64.2	....	94.2	....	
14.0	14.0	20.5	20.5	30.1	30.1	44.2	44.2	64.9	64.9	95.3	95.3	
14.2	....	20.8	....	30.5	....	44.8	....	65.7	....	96.5	....	
14.3	14.3	21.0	21.0	30.9	30.9	45.3	45.3	66.5	66.5	97.6	97.6	
14.5	....	21.3	....	31.2	....	45.9	....	67.3	....	98.8	....	

Standard resistance values are obtained from the decade table by multiplying by powers of 10. As an example, 13.3 can represent 13.3 ohms, 133 ohms, 1.33K, 13.3K, 133K, 1.33 megohms.

EIA Color Code

Significant Figures

Black = 0 Green = 5
Brown = 1 Blue = 6
Red = 2 Violet = 7
Orange = 3 Grey = 8
Yellow = 4 White = 9

Multiplier (number of zeros to follow)

Black = None Yellow = 0000
Brown = 0 Green = 00000
Red = 00 Blue = 000000
Orange = 000 Gold = X .1
Silver = X .01

Tolerance

Brown = $\pm 1\%$
Red = $\pm 2\%$
Gold = $\pm 5\%$
Silver = $\pm 10\%$
No Band = $\pm 20\%$

PART NUMBER EXPLANATIONS

Page 6-8

RN	55	MILITARY	1002	F
Fixed film precision resistor (QPL to MIL-R-10509)	Case Size 50, 55, 60, 65, 70	Temperature Coefficient E = ± 25 PPM C = ± 50 PPM D = ± 200 PPM -500PPM	Resistance in ohms. 3 significant figures plus multiplier or number of zeros to follow.	Resistance Tolerance *B = $\pm .1\%$ *C = $\pm .25\%$ D = $\pm .5\%$ F = $\pm 1\%$

*Available only in Characteristic E and C (± 25 and ± 50 PPM/ $^{\circ}$ C)

CORNING

NE	55	49.9R	1%
Corning Style NE = ± 25 PPM ME = ± 25 PPM NC = ± 50 PPM MC = ± 50 PPM NA = ± 100 PPM	Case Size 50, 55, 60, 65, 70	Value in ohms R = ohms K = thousand ohms M = million ohms	Resistance Tolerance $\pm .1\%$ $\pm .25\%$ $\pm .5\%$ $\pm 1\%$

Page 10

RLR	20	C
Established Reliability Fixed Film Resistor (± 100 PPM/ $^{\circ}$ C)	Size Power rating at 70° C 05 = $\frac{1}{8}$ watt 07 = $\frac{1}{4}$ watt 20 = $\frac{1}{2}$ watt 32 = 1 watt	Lead Material Type C solderable/weldable.

1003	G	R
Coded Resistance Value ohms. First 3 digits are significant figures, fourth digit is the multiplier. $\pm 5\%$ parts use a three digit code.	Tolerance J = $\pm 5\%$ G = $\pm 2\%$ F = $\pm 1\%$	Failure Rate 1000 Hours (60% confidence) M = 1.0% P = 0.1% R = .01%

page 12

RNC	55	H
Established Reliability Precision Molded Metal Film Resistor. RNC with solderable/weldable leads. RNR with solderable leads.	Case Size 50 55 60 65	Characteristic J = non-hermetic ± 25 PPM/ $^{\circ}$ C H = non-hermetic ± 50 PPM/ $^{\circ}$ C K = non-hermetic ± 100 PPM/ $^{\circ}$ C

1001	F	S
Coded Resistance Value. First 3 digits are significant figures, fourth digit is the multiplier.	Tolerance B = $\pm 0.1\%$ D = $\pm 0.5\%$ F = $\pm 1.0\%$	Failure Rate Level - % per 1000 Hours (60% confidence) M = 1.0% P = 0.1% R = .01% S = .001%

Page 14

RL	20	MILITARY	104	G
Fixed Film Resistor (QPL to MIL-R-22684)	Case Size 07 20 32 42	Solderable Lead	Resistance value in ohms. First 2 digits are significant figures. 3rd digit is the multiplier.	Resistance Tolerance G = $\pm 2\%$ J = $\pm 5\%$

C	5	100K	2%
Style C CS FP	Case Size 3, 4, 5, 6, 05, 07, 20, 32, 42,	Value in ohms R = ohms K = thousand ohms M = million ohms	Resistance Tolerance $\pm 1\%$ $\pm 2\%$ $\pm 5\%$ $\pm 10\%$

COMMERCIAL

Page 16

FP	2
Flameproof Resistor	Case Size $\frac{1}{4}$, $\frac{1}{2}$, 1 2, 3 4, 5 7, 10 67, 69

51.1K	$\pm 1\%$
Value in Ohms R = Ohms K = Thousand Ohms M = Million Ohms 51.1K = 51100 Ohms 51.1R = 51.1 Ohms	Tolerance $\pm 1\%$ $\pm 2\%$ $\pm 5\%$ $\pm 10\%$

Page 18

FP	55	E
Flameproof Resistor	Case Size 55 60	Temperature Coefficient C = 50PPM/ $^{\circ}$ C E = 25PPM/ $^{\circ}$ C - = 100PPM/ $^{\circ}$ C

51.1K	$\pm 1\%$
Value in Ohms R = Ohms K = Thousand Ohms M = Million Ohms 51.1K = 51100 Ohms 51.1R = 51.1 Ohms	Tolerance $\pm .1\%$ $\pm .25\%$ $\pm .5\%$ $\pm 1\%$ $\pm 2\%$ $\pm 5\%$ $\pm 10\%$

Page 20

FL	4	D	26.4R	$\pm 1\%$
Style FL = Flameproof LO = Non-Flameproof	Case Size 4, 5	Temperature Coefficient D = 100PPM/ $^{\circ}$ C C = 50PPM/ $^{\circ}$ C	Value in Ohms R = Ohms K = Thousand Ohms M = Million Ohms 26.4K = 26400 Ohms 26.6R = 26.6 Ohms	Tolerance $\pm 1\%$ $\pm 2\%$ $\pm 5\%$

Introduction to Ceramic/GLASS-K™ Capacitors

CORNING

Corning Glass Works has been producing high quality ceramic capacitors for over ten years. Our molded military styles are qualified to MIL-C-11015 and MIL-C-39014. Corning pioneered and introduced in 1972 SPINSEAL™ axial ceramic capacitors coated with epoxy for commercial applications.

Concentrated effort on the development and manufacture of axial ceramic capacitors has resulted in our high quality high volume capacity, and technological leadership. Corning's emphasis on the axial configuration results from the growing need for automatic handling of electronic components. Corning's axial leaded capacitors are available lead taped and reeled. They're ideally suited for the automatic handling operations of sequencing, forming and insertion.

HIGHEST QUALITY CONSTRUCTION

Chip

The chip is the monolithic ceramic capacitor element. It is the major source of all electrical characteristics of the finished capacitor.

Quality cannot be added to the finished chip. The chip must have the quality built in from the beginning. Corning carefully stacks alternate layers of precisely controlled dielec-

tric and proprietary electrode materials to form the chip. The chip is then fused into a solid monolithic configuration assuring reliability and volumetric efficiency. The final stage of chip manufacture is the application of a silver end termination which is fired on to assure permanent electrode contact.

Lead Attach

A unique, tightly controlled, highly automated lead attach process results in a reliable bonding of the leads to the capacitor chip. The ability of the axial ceramic capacitor to withstand the rigors of automatic insertion and to maintain a dependable electrical contact over the life of the circuit depends upon a sound lead attach.

Coating

The products qualified to MIL-C-11015 and MIL-C-39014 are encapsulated by a transfer molding process which ensures compliance to both the maximum and minimum dimensions specified.

SPINSEAL industrial axial ceramic capacitors are coated by a high volume, automated process which ensures a uniform conformal coating. The conformally coated ceramic capacitors essentially meet the maximum dimensions specified for the molded product and meets the flammability require-

ments of UL-94-VO. Regardless of the coating specified, molded or conformal, the performance of the product is assured by the excellent environmental protection offered by either coating method.

Dielectrics

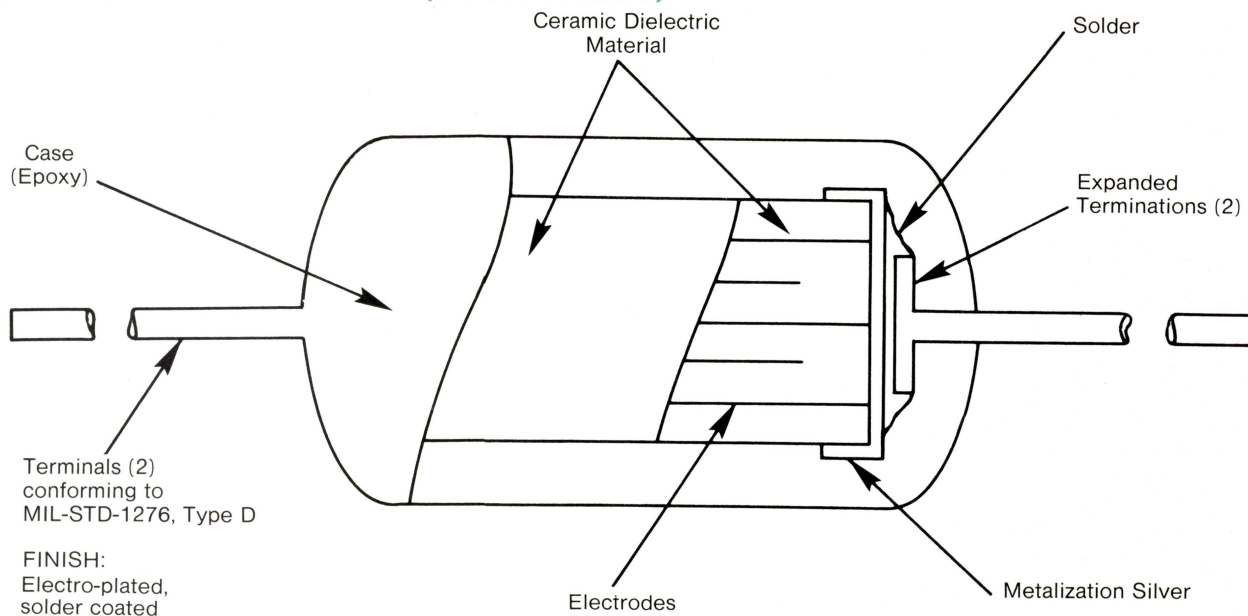
The military qualified products are supplied with the BX, BT, BU, BV and BR temperature characteristics specified by MIL-C-10015 and MIL-C-39014.

The industrial products are available in one of three different dielectrics, depending on the performance desired:

- COG dielectric offers the ultra-stable performance of 0 ± 30 PPM temperature characteristic.
- X7R dielectric offers the stable performance of $\pm 15\%$ temperature characteristic.
- Z5U dielectric offers the general purpose $+22\% -56\%$ temperature characteristic.

GLASS-K™ glass-ceramic capacitors are made from a proprietary material especially formulated to give a high dielectric constant with the inherent stability of glass. Corning's leadership in glass technology assures performance and reliability of this product line which is qualified to MIL-C-11015 and MIL-C-39014.

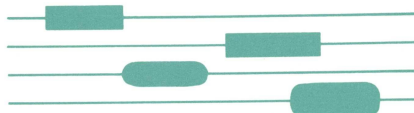
SPINSEAL STYLE CAPACITOR (COG/X7R/Z5U)



CERAMIC/GLASS-K™ CAPACITORS

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For the following:

- Placement of orders
- Price quotations
- Delivery
- Specifications or drawing reviews
- Samples
- Location of a franchised distributor

Contact:

Customer Service

Corning Glass Works
3900 Electronics Drive
Raleigh, NC 27604
(919) 876-1100
TLX — 579411
TWX — 510-928-1840

- Technical information
Product capabilities
Applications assistance

Customer Engineering

Corning Glass Works
3900 Electronics Drive
Raleigh, NC 27604
(919) 876-1100
TLX — 579411
TWX — 510-928-1840

CAPACITORS — ALPHABETICAL LISTING OF MILITARY PART NUMBERS

Military Part No.	Corning Part No.	Component Type	Page No.	Military Part No.	Corning Part No.	Component Type	Page No.
CK12	CK12	Ceramic Capacitor	38	CY08	TY08	Glass Capacitor	64
CK13	CK13	Ceramic Capacitor	38	CY10	CYFM10	Glass Capacitor	62
CK14	CK14	Ceramic Capacitor	38	CY15	CYFM15	Glass Capacitor	62
CK31	CK31	Glass-K™ Capacitor	42	CY20	CYFM20	Glass Capacitor	62
CK32	CK32	Glass-K™ Capacitor	42	CY30	CYFM30	Glass Capacitor	62
CKR11	CKR11	Ceramic Capacitor	36	CYR10	CYR10	Glass Capacitor	68
CKR12	CKR12	Ceramic Capacitor	36	CYR15	CYR15	Glass Capacitor	68
CKR14	CKR14	Ceramic Capacitor	36	CYR20	CYR20	Glass Capacitor	68
CKR31	CKR31	Glass-K™ Capacitor	40	CYR30	CYR30	Glass Capacitor	68
CKR32	CKR32	Glass-K™ Capacitor	40	CYR51	CYR51	Glass Capacitor	70
CY06	TY06	Glass Capacitor	64	CYR52	CYR52	Glass Capacitor	70
CY07	TY07	Glass Capacitor	64	CYR53	CYR53	Glass Capacitor	70

CAPACITORS — MILITARY SPECIFICATION CROSS-REFERENCE

Military Specification	Military Part No.	Corning Part No.	Page No.	Military Specification	Military Part No.	Corning Part No.	Page No.
MIL-C-11015 (Ceramic Capacitors)	CK12	CK12	38	MIL-C-39014 (Established Reliability) (Ceramic Capacitors)	CKR11	CKR11	36
	CK13	CK13	38		CKR12	CKR12	36
	CK14	CK14	38		CKR14	CKR14	36
	CK31	CK31	42		CKR31	CKR31	40
	CK32	CK32	42		CKR32	CKR32	40
MIL-C-11272 (Glass Capacitors)	CY06	TY06	64	MIL-C-23269 (Established Reliability) (Glass Capacitors)	CYR10	CYR10	68
	CY07	TY07	64		CYR15	CYR15	68
	CY08	TY08	64		CYR20	CYR20	68
	CY10	CYFM10	62		CYR30	CYR30	68
	CY15	CYFM15	62		CYR51	CYR51	70
	CY20	CYFM20	62		CYR52	CYR52	70
	CY30	CYFM30	62		CYR53	CYR53	70

CAPACITORS — ALPHABETICAL LISTING OF CORNING PART NUMBERS

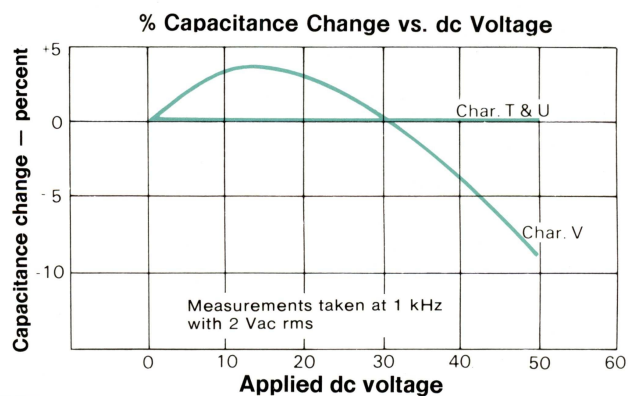
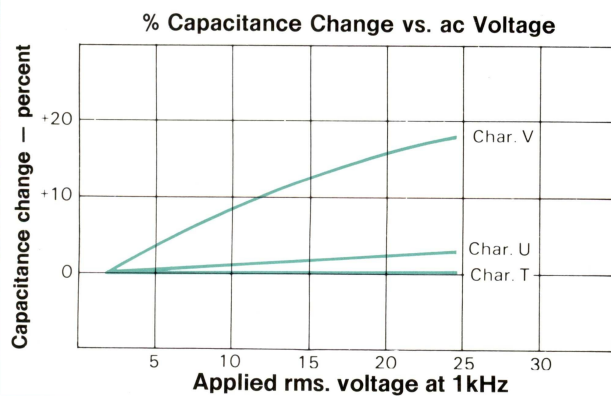
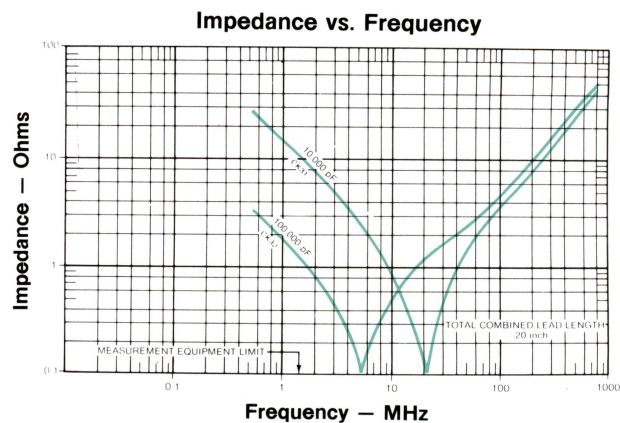
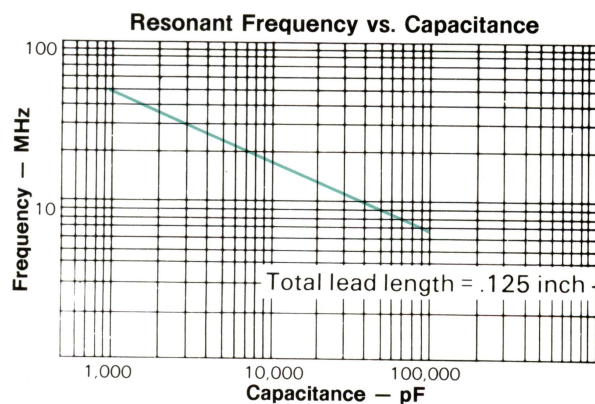
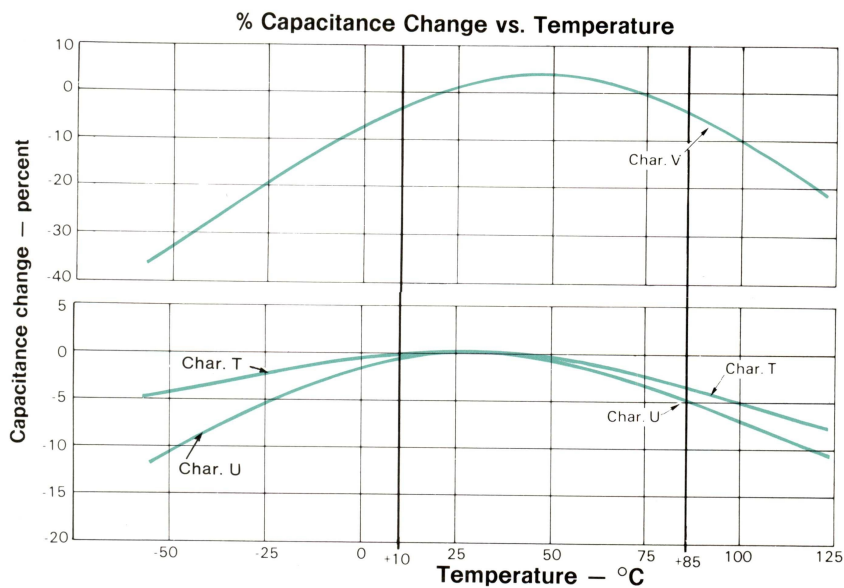
Corning Part No.	Military Part No.	Component Type	Page No.	Corning Part No.	Military Part No.	Component Type	Page No.
CACZ5U	None	Ceramic Capacitor	30	MD5	None	Tantalum Capacitor	54
CACX7R	None	Ceramic Capacitor	32	MD6	None	Tantalum Capacitor	54
CACCOG	None	Ceramic Capacitor	34	MKA	None	Tantalum Capacitor	56
CK12	CK12	Ceramic Capacitor	38	MKB	None	Tantalum Capacitor	56
CK13	CK13	Ceramic Capacitor	38	MKC	None	Tantalum Capacitor	56
CK14	CK14	Ceramic Capacitor	38	MKD	None	Tantalum Capacitor	56
CK31	CK31	Ceramic Capacitor	42	MKE	None	Tantalum Capacitor	56
CK32	CK32	Ceramic Capacitor	42	MMF	None	Tantalum Capacitor	48
CKR11	CKR11	Ceramic Capacitor	36	MMJ	None	Tantalum Capacitor	48
CKR12	CKR12	Ceramic Capacitor	36	MML	None	Tantalum Capacitor	48
CKR14	CKR14	Ceramic Capacitor	36	MMM	None	Tantalum Capacitor	48
CKR31	CKR31	Glass-K™ Capacitor	40	MMS	None	Tantalum Capacitor	48
CKR32	CKR32	Glass-K™ Capacitor	40	MMU	None	Tantalum Capacitor	48
CYFM10	CY10	Glass Capacitor	62	MMW	None	Tantalum Capacitor	48
CYFM15	CY15	Glass Capacitor	62	MNA	None	Tantalum Capacitor	52
CYFM20	CY20	Glass Capacitor	62	MNB	None	Tantalum Capacitor	52
CYFM30	CY30	Glass Capacitor	62	MNF	None	Tantalum Capacitor	52
CYFR10	None	Glass Capacitor	66	MNG	None	Tantalum Capacitor	52
CYFR15	None	Glass Capacitor	66	MNL	None	Tantalum Capacitor	52
CYFR20	None	Glass Capacitor	66	MNM	None	Tantalum Capacitor	52
CYFR30	None	Glass Capacitor	66	MNP	None	Tantalum Capacitor	52
CYR10	CYR10	Glass Capacitor	68	MNS	None	Tantalum Capacitor	52
CYR15	CYR15	Glass Capacitor	68	MNY	None	Tantalum Capacitor	52
CYR20	CYR20	Glass Capacitor	68	MZA	None	Tantalum Capacitor	50
CYR30	CYR30	Glass Capacitor	68	MZB	None	Tantalum Capacitor	50
CYR51	CYR51	Glass Capacitor	70	MZG	None	Tantalum Capacitor	50
CYR52	CYR52	Glass Capacitor	70	MZP	None	Tantalum Capacitor	50
CYR53	CYR53	Glass Capacitor	70	MZY	None	Tantalum Capacitor	50
MD2	None	Tantalum Capacitor	54	TY06	CY06	Glass Capacitor	64
MD3	None	Tantalum Capacitor	54	TY07	CY07	Glass Capacitor	64
MD4	None	Tantalum Capacitor	54	TY08	CY08	Glass Capacitor	64

Capacitor Selector Guide

CORNING

CAPACITOR CHARACTERISTICS		DIELECTRIC TYPES											
		GLASS		GLASS-K	CERAMIC				TANTALUM				
CORNING TYPES		CYFM10-30 CYFR10-30 CYR10-30	TY06-08 CYR51-53	CK31, 32 CKR31, 32	CK12, 13, 14 CKR11, 12, 14	CAC			MINITAN MODULAR	MINITAN CORDWOOD	MINITAN NONPOLAR	MINIDIPS	CHIPS
						Z5U	X7R	COG					
CAPACITANCE	Capacitance Range	.5 - 10,000 pF.	1 - 2400 pF.	270 - 100,000 pF.	10 to 270,000 pF	1,000 to 470,000 pF	10 to 270,000 pF	1.0 to 10,000 pF	.001 to 220 μ F.	.001 to 47 μ F.	.001 to 33 μ F.	.1 to 68 μ F.	.1 to 47 μ F.
	Standard Tolerance	$\pm$ 1 to 20%	TY0 $\pm$ 1 to 20% CYR $\pm$ 1 to 5%	$\pm$ 10 or 20%	$\pm$ 10 or 20%	$\pm$ 20% or +80, - 20%	$\pm$ 10 or 20%	$\pm$ 1% to $\pm$ 20%	$\pm$ 5 to 20%	$\pm$ 5 to 20%	$\pm$ 5 to 20%	$\pm$ 10% or 20%	$\pm$ 5% to $\pm$ 20%
	Minimum Tolerance	$\pm$ 1% or $\pm$.25 pF.	$\pm$ 1% or $\pm$.25 pF.	$\pm$ 5% on "T" Char. others $\pm$ 10%	$\pm$ 10%	$\pm$ 20%	$\pm$ 10%	$\pm$ 1% or $\pm$.25pF	$\pm$ 5%	$\pm$ 5%	$\pm$ 5%	$\pm$ 10%	$\pm$ 5%
VOLTS	DC Operating Volts	300 VDC and 500 VDC	300 VDC	50 VDC	50 VDC and 100 VDC	50 VDC and 100 VDC	50 VDC and 100 VDC	50 VDC and 100 VDC	2 to 35 VDC	2 to 50 VDC	2 to 50 VDC	2 to 35 VDC	10 to 50 VDC
	Operating Frequency	DC to VHF	DC to VHF	DC to VHF	DC to VHF	DC to VHF	DC to VHF	DC to VHF	DC to 1 MHz	DC to 1 MHz	DC to 1 MHz	DC to 1 MHz	DC to 1 MHz
DISSIPATION FACTOR	% @ 120 Hz.								6 to 15%	6 to 10%	6 to 10%	8 to 15%	4 to 6%
	% @1 KHz > 100pF 1MHz < 100pF	.1% @25°C.	.1% > 100 pF. .2% < 100 pF.	1 to 3%	2.5% Max.	3.0% Max.	2.5% Max.	.1% Max.					
INSULATION RESISTANCE	Meg Ω	100,000 @25°C.	100,000 @25°C.	100,000 Meg Ω or 1000 M Ω - μ F. whichever is less	100,000 Meg Ω or 1000 M Ω - μ F. whichever is less	10,000 Meg Ω or 1000 M Ω - μ F. whichever is less	100,000 Meg Ω or 1000 M Ω - μ F. whichever is less	100,000 Meg Ω or 1000 M Ω - μ F. whichever is less	Seldom Used	Seldom Used	Seldom Used	Seldom Used	Seldom Used
	M Ω - μ F.												
TEMPERATURE	Operating Range	- 55°C. to + 125°C.	- 55°C. to + 125°C.	- 55°C. to + 125°C.	- 55°C. to + 125°C.	+ 10°C to + 85°C	- 55°C to + 125°C	- 55°C to + 125°C	- 55°C. to + 125°C.	- 55°C. to + 125°C.	- 55°C. to + 125°C.	- 55°C. to + 85°C.	- 55°C. to + 125°C.
	Temperature Characteristic	+ 140 $\pm$ 25 PPM/°C	+ 140 $\pm$ 25 PPM/°C	+ 2, - 10 or + 2, - 15 or + 20, - 45%	$\pm$ 15% BX and BR	+ 22, - 56%	$\pm$ 15%	0 $\pm$ 30PPM/°C	Seldom Used	Seldom Used	Seldom Used	Seldom Used	Seldom Used
PHYSICAL CHARACTERISTICS	Volumetric Efficiency	Low	Low	Moderate	Moderate	High	Moderate	Low	Very High	Very High	High	High	High
	Lead Type	Axial	Radial	Axial	Axial	Axial	Axial	Axial	Axial and Radial	Axial and Radial	Axial and Radial	Radial	None (Chip)
RELATIVE COST FOR EQUIVALENT CV RATING		High	High	Moderate	Moderate	Low	Low	Moderate	Moderate	Moderate	Moderate	Low	Low
MIL-SPECS MIL-C-		11272 and 23269	11272 and 23269	CK31, 32 (11015/25) CKR31, 32 (39014/21)	CK12, 13, 14 (11015/20) CKR11, 12, 14 (39014/5)	None			Tested to MIL-C-55365		None		
CATALOG PAGE NUMBERS		62, 66, 68	64, 70	40, 42	36, 38	30	32	34	48	50	52	54	56

GLASS-K™ CAPACITOR PERFORMANCE CURVES

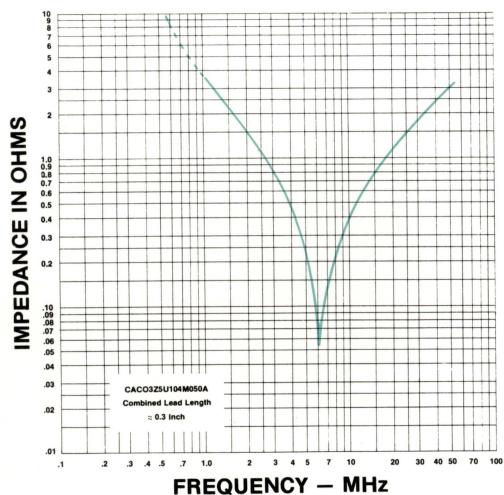


Ceramic Capacitors

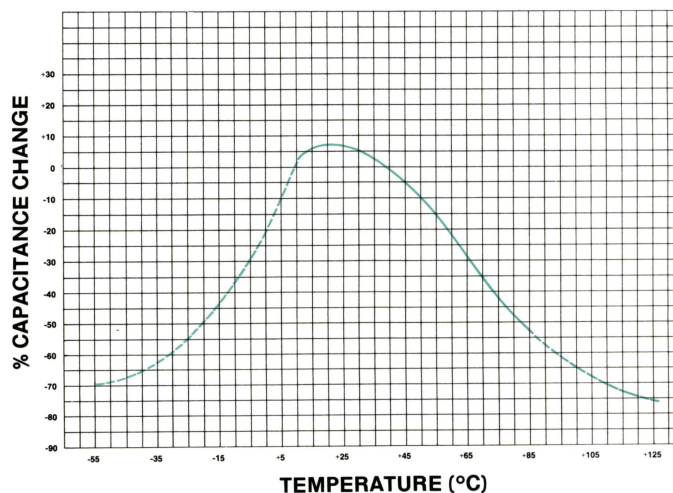
CORNING

CERAMIC CAPACITOR PERFORMANCE CURVES

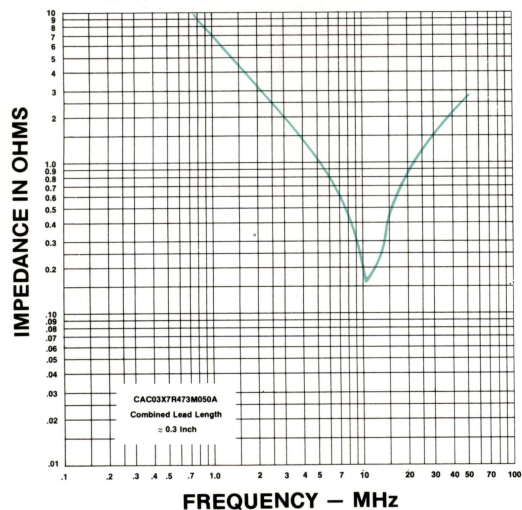
Z5U IMPEDANCE VS. FREQUENCY



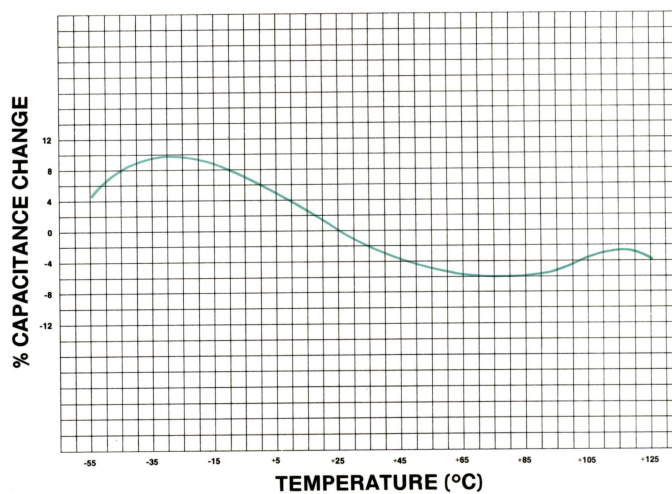
Z5U TYPICAL TEMPERATURE CHARACTERISTIC



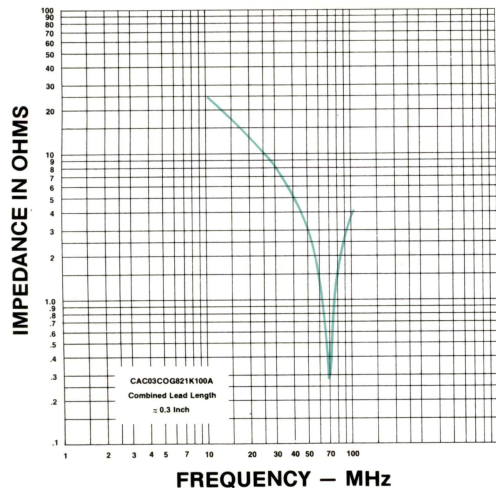
X7R IMPEDANCE VS. FREQUENCY



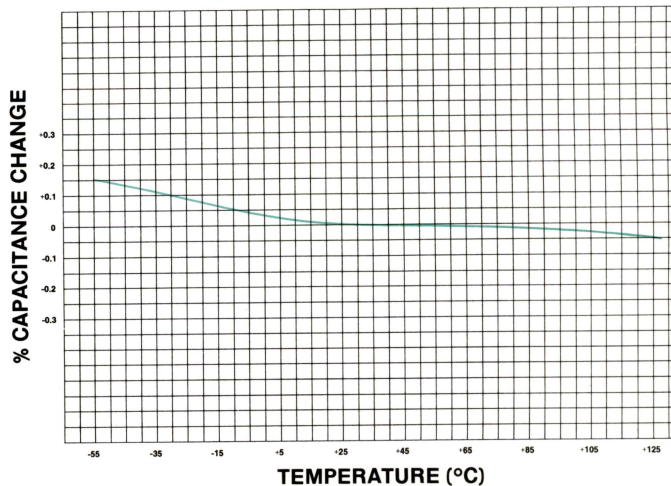
X7R TYPICAL TEMPERATURE CHARACTERISTIC



COG IMPEDANCE VS. FREQUENCY



COG TYPICAL TEMPERATURE CHARACTERISTIC



Ceramic Capacitors

CORNING

CAC02, 03, 04, 05
SPINSEAL™ Z5U CAPACITORS

APPLICATIONS

These conformally coated axial leaded ceramic capacitors are designed for high volume commercial and industrial applications which specify general purpose T.C. performance. Applications include bypass, blocking /coupling, filtering and transient suppression. High speed encapsulation technology enables us to manufacture axial ceramic capacitors in high volume while closely controlling uniformity and performance. Spinseal capacitors are especially suited for automatic insertion.

PERFORMANCE CHARACTERISTICS:

Capacitance Tolerance:

M = $\pm 20\%$
Z = +80, -20%
X = GMV

Temperature Characteristic:

Z5U (general purpose) +22%, -56%
from +10°C to +85°C.

Dissipation Factor:

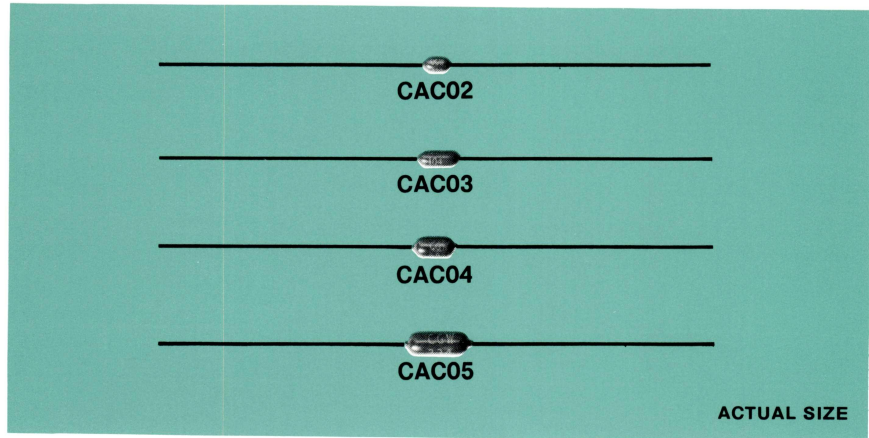
3.0% Maximum at 1KHz

Insulation Resistance:

10,000 megohms or 1,000 megohm-microfarads, whichever is less.

Dielectric Strength:

2.5 times rated voltage for 1 to 5 seconds.



QUALITY ASSURANCE REQUIREMENTS:

Our Spinseal miniature monolithic capacitors are tested in accordance with EIA RS - 198. Each lot is inspected for:

- Capacitance
- Dissipation Factor
- Insulation Resistance
- Dielectric Strength
- Visual Examination

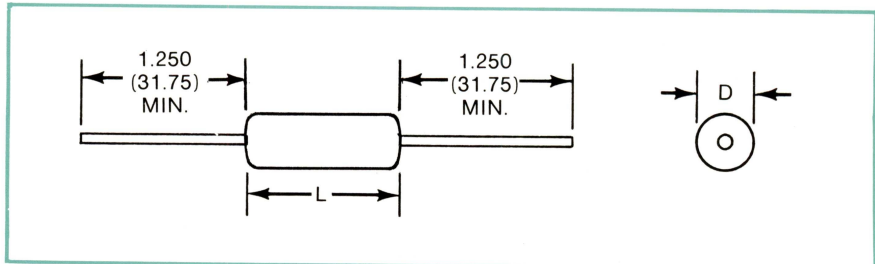


TABLE OF DIMENSIONS AND CAPACITANCE RANGE

Case Size	Dimensions — Inches (Millimeters)		Lead Dia. $\pm .002$ (.05)	Voltage Rating	Z5U * Capacitance Range
	L MAX	D MAX			
CAC02	.170 (4.32)	.100 (2.54)	.020 (.51)	100 50	.001 μ F to .022 μ F .01 μ F to .047 μ F
CAC03	.260 (6.60)	.100 (2.54)	.020 (.51)	100 50	.018 μ F to .056 μ F .056 μ F to .12 μ F
CAC04	.270 (6.86)	.150 (3.81)	.020 (.51)	100 50	.056 μ F to .12 μ F .10 μ F to .27 μ F
CAC05	.400 (10.16)	.150 (3.81)	.025 (.64)	100 50	.10 μ F to .27 μ F .22 μ F to .47 μ F

*Parts not shown on the ordering information chart are available, within the above range, upon request.

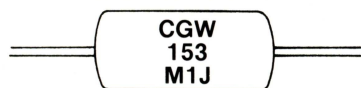
NOTE: All leads are solder coated Dumet.

PART NUMBERS AND ORDERING INFORMATION

CAC02 PART NUMBERS		CAC02 PART NUMBERS (cont'd.)		CAC03 PART NUMBERS (cont'd.)		CAC04 PART NUMBERS (cont'd.)	
CAP.	100 VOLT	CAP.	100 VOLT	CAP.	50 VOLT	CAP.	50 VOLT
1000pF CAC02Z5U102 *	100A	.018μF CAC02Z5U183	100A	.068μF CAC03Z5U683	050A	.22μF CAC04Z5U224 *	050A
1200pF CAC02Z5U122	100A	.022μF CAC02Z5U223	100A	.082μF CAC03Z5U823	050A	.27μF CAC04Z5U274	050A
1500pF CAC02Z5U152	100A	CAP. 50 VOLT		.10μF CAC03Z5U104	050A	CAC05 PART NUMBERS	
1800pF CAC02Z5U182	100A	.027μF CAC02Z5U273 *	050A	.12μF CAC03Z5U124	050A		
2200pF CAC02Z5U222	100A	.033μF CAC02Z5U333	050A	CAC04 PART NUMBERS		CAP. 100 VOLT	
2700pF CAC02Z5U272	100A	.039μF CAC02Z5U393	050A	CAP. 100 VOLT		.15μF CAC05Z5U154 *	100A
3300pF CAC02Z5U332	100A	.047μF CAC02Z5U473	050A	.068μF CAC04Z5U683 *	100A	.18μF CAC05Z5U184	100A
3900pF CAC02Z5U392	100A	CAC03 PART NUMBERS		.082μF CAC04Z5U823	100A	.22μF CAC05Z5U224	100A
4700pF CAC02Z5U472	100A	CAP. 100 VOLT		.10μF CAC04Z5U104	100A	.27μF CAC05Z5U274	100A
5600pF CAC02Z5U562	100A	.027μF CAC03Z5U273 *	100A	.12μF CAC04Z5U124	100A	CAP. 50 VOLT	
6800pF CAC02Z5U682	100A	.033μF CAC03Z5U333	100A	CAP. 50 VOLT		.27μF CAC05Z5U274 *	050A
8200pF CAC02Z5U822	100A	.039μF CAC03Z5U393	100A	.15μF CAC04Z5U154 *	050A	.33μF CAC05Z5U334	050A
.010μF CAC02Z5U103	100A	.047μF CAC03Z5U473	100A	.18μF CAC04Z5U184	050A	.39μF CAC05Z5U394	050A
.012μF CAC02Z5U123	100A	.056μF CAC03Z5U563	100A			.47μF CAC05Z5U474	050A
.015μF CAC02Z5U153	100A						

*Insert M, Z or X to indicate tolerance.

PART MARKING



CGW — Corning Glass Works
 153 — Capacitance
 M — Tolerance
 1 — Voltage Rating Designator
 1 = 100V, 5 = 50V
 J — Temperature Characteristic, Z5U

PART NUMBER EXPLANATION

C	A	C	02	Z5U	153	M	100	A
Corning Ceramic Capacitor	Axial Leads	Conformal Coating	Case Size 02, 03 04, 05	Temperature Characteristic Z5U (+22-56% from +10°C to +85°C)	Capacitance Value in pF. Two significant figures plus multiplier. 153 = .015 μF	Capacitance Tolerance M = ±20% Z = +80% -20% X = GMV	Voltage Rating 050 - 50 Volt 100 - 100 Volt	Failure Rate A - not applicable

Ceramic Capacitors

CORNING

CAC02, 03, 04, 05
SPINSEAL™ X7R CAPACITORS

APPLICATIONS

These conformally coated axial leaded ceramic capacitors are designed for high volume commercial and industrial applications which require stable performance. Applications include bypass, general purpose timing, blocking/coupling, filtering and transient suppression. High speed encapsulation technology enables us to manufacture axial ceramic capacitors in high volume while closely controlling uniformity and performance. Spinseal™ capacitors are especially suited for automatic insertion.

PERFORMANCE CHARACTERISTICS:

Capacitance Tolerance:

K = $\pm 10\%$

M = $\pm 20\%$

Temperature Characteristic:

X7R(stable) $\pm 15\%$ from -55°C to $+125^{\circ}\text{C}$.

Dissipation Factor:

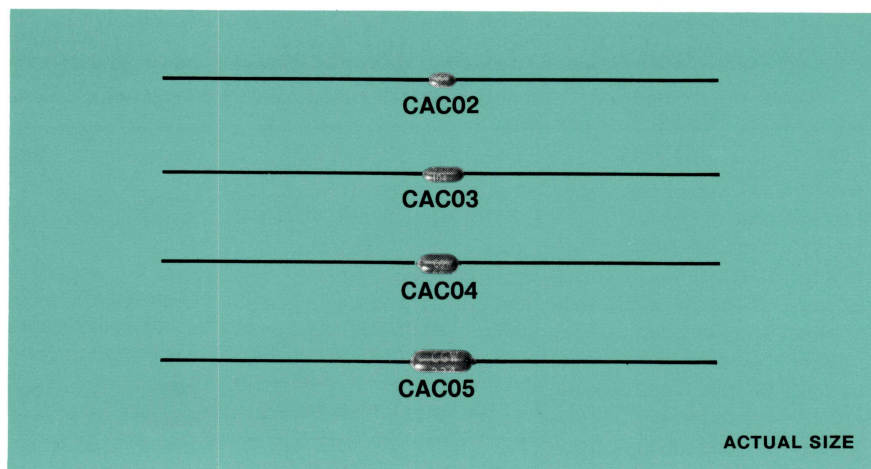
2.5% Maximum at 1 KHz

Insulation Resistance:

100,000 megohms or 1000 megohm-microfarads, whichever is less.

Dielectric Strength:

2.5 times rated voltage for 1 to 5 seconds.



QUALITY ASSURANCE REQUIREMENTS:

Our Spinseal miniature monolithic capacitors are tested in accordance with EIA RS - 198. Each lot is inspected for:

- Capacitance
- Dissipation Factor
- Insulation Resistance
- Dielectric Strength
- Visual Examination

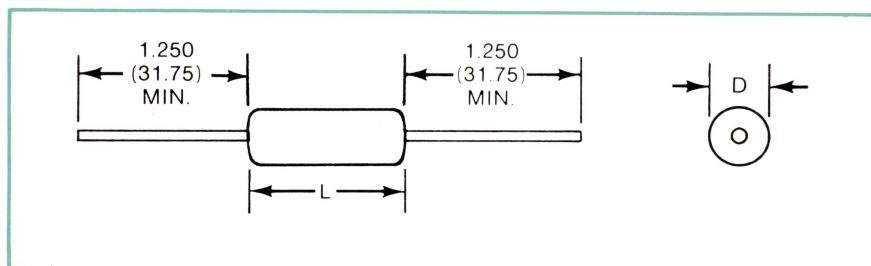


TABLE OF DIMENSIONS AND CAPACITANCE RANGE

Case Size	Dimensions — Inches (Millimeters)		Lead Dia. $\pm .002$ (.05)	Voltage Rating	X7R * Capacitance Range
	L MAX	D MAX			
CAC02	.170 (4.32)	.100 (2.54)	.020 (.51)	100 50	10 pF to 6800 pF 5600 pF to .022 μF
CAC03	.260 (6.60)	.100 (2.54)	.020 (.51)	100 50	5600 pF to .015 μF .018 μF to .047 μF
CAC04	.270 (6.86)	.150 (3.81)	.020 (.51)	100 50	.01 μF to .047 μF .047 μF to .10 μF
CAC05	.400 (10.16)	.150 (3.81)	.025 (.64)	100 50	.01 μF to .10 μF .12 μF to .27 μF

*Parts not shown on the ordering information chart are available, within the above range, upon request.

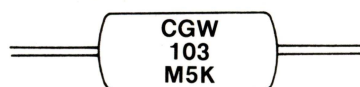
NOTE: All leads are solder coated Dumet.

PART NUMBERS AND ORDERING INFORMATION

CAC02 PART NUMBERS		CAC02 PART NUMBERS (cont'd.)		CAC03 PART NUMBERS		CAC04 PART NUMBERS (cont'd.)	
CAP.	100 VOLT	CAP.	100 VOLT	CAP.	100 VOLT	CAP.	50 VOLT
10pF	CAC02X7R100 * 100A	680pF	CAC02X7R681 — 100A	8200pF	CAC03X7R822 * 100A	.056μF	CAC04X7R563 * 050A
12pF	CAC02X7R120 — 100A	820pF	CAC02X7R821 — 100A	.010μF	CAC03X7R103 — 100A	.068μF	CAC04X7R683 — 050A
15pF	CAC02X7R150 — 100A	1000pF	CAC02X7R102 — 100A	.012μF	CAC03X7R123 — 100A	.082μF	CAC04X7R823 — 050A
18pF	CAC02X7R180 — 100A	1200pF	CAC02X7R122 — 100A	.015μF	CAC03X7R153 — 100A	.10μF	CAC04X7R104 — 050A
22pF	CAC02X7R220 — 100A	1500pF	CAC02X7R152 — 100A				
27pF	CAC02X7R270 — 100A	1800pF	CAC02X7R182 — 100A	CAP.	50 VOLT	CAC05 PART NUMBERS	
33pF	CAC02X7R330 — 100A	2200pF	CAC02X7R222 — 100A	.018μF	CAC03X7R183 * 050A	CAP.	100 VOLT
39pF	CAC02X7R390 — 100A	2700pF	CAC02X7R272 — 100A	.022μF	CAC03X7R223 — 050A	.056μF	CAC05X7R563 * 100A
47pF	CAC02X7R470 — 100A	3300pF	CAC02X7R332 — 100A	.027μF	CAC03X7R273 — 050A	.068μF	CAC05X7R683 — 100A
56pF	CAC02X7R560 — 100A	3900pF	CAC02X7R392 — 100A	.033μF	CAC03X7R333 — 050A	.082μF	CAC05X7R823 — 100A
68pF	CAC02X7R680 — 100A	4700pF	CAC02X7R472 — 100A	.039μF	CAC03X7R393 — 050A	.10μF	CAC05X7R104 — 100A
82pF	CAC02X7R820 — 100A	5600pF	CAC02X7R562 — 100A	.047μF	CAC03X7R473 — 050A		
100pF	CAC02X7R101 — 100A	6800pF	CAC02X7R682 — 100A			CAP.	50 VOLT
120pF	CAC02X7R121 — 100A			CAC04 PART NUMBERS		.12μF	CAC05X7R124 * 050A
150pF	CAC02X7R151 — 100A	CAP.	50 VOLT	CAP.	100 VOLT	.15μF	CAC05X7R154 — 050A
180pF	CAC02X7R181 — 100A	5600pF	CAC02X7R562 * 050A	.018μF	CAC04X7R183 — 100A	.18μF	CAC05X7R184 — 050A
220pF	CAC02X7R221 — 100A	6800pF	CAC02X7R682 — 050A	.022μF	CAC04X7R223 — 100A	.22μF	CAC05X7R224 — 050A
270pF	CAC02X7R271 — 100A	8200pF	CAC02X7R822 — 050A	.027μF	CAC04X7R273 — 100A	.27μF	CAC05X7R274 — 050A
330pF	CAC02X7R331 — 100A	.010μF	CAC02X7R103 — 050A	.033μF	CAC04X7R333 — 100A		
390pF	CAC02X7R391 — 100A	.012μF	CAC02X7R123 — 050A	.039μF	CAC04X7R393 — 100A		
470pF	CAC02X7R471 — 100A	.015μF	CAC02X7R153 — 050A	.047μF	CAC04X7R473 — 100A		
560pF	CAC02X7R561 — 100A	.018μF	CAC02X7R183 — 050A				
		.022μF	CAC02X7R223 — 050A				

*Insert M or K to indicate tolerance.

PART MARKING



CGW — Corning Glass Works
 103 — Capacitance
 M — Tolerance
 5 — Voltage Rating Designator
 1 = 100V, 5 = 50V
 K — Temperature Characteristic, X7R

PART NUMBER EXPLANATION

C	A	C	02	X7R	103	M	050	A
Corning Ceramic Capacitor	Axial Leads	Conformal Coating	Case Size 02, 03 04, 05	Temperature Characteristic X7R (±15% from -55°C to +125°C)	Capacitance Value in pF. Two significant figures plus multiplier. 103 = 10,000pF.	Capacitance Tolerance K = ±10% M = ±20%	Voltage Rating 050-50 volt 100-100 volt	Failure Rate A - not applicable

Ceramic Capacitors

CORNING

CAC02, 03, 04, 05
SPINSEAL™ COG CAPACITORS

APPLICATIONS

These conformally coated axial lead ceramic capacitors are designed for high volume commercial and industrial applications which require ultra-stable performance. Applications include precision timing, active and passive filtering, frequency setting, and tuning. High speed encapsulation technology enables us to manufacture axial ceramic capacitors in high volume while closely controlling uniformity and performance. Spinseal™ capacitors are especially suited for automatic insertion.

PERFORMANCE

CHARACTERISTICS:

Capacitance Tolerance:

M = $\pm 20\%$ G = $\pm 2\%$
K = $\pm 10\%$ F = $\pm 1\%$
J = $\pm 5\%$ D = $\pm 0.5\text{pF}$
C = $\pm 0.25\text{pF}$

Available tolerances for each capacitance value are shown in the ordering information table.

Temperature Characteristics:

COG (ultra-stable). $0 \pm 30\text{PPM}/^\circ\text{C}$
from -55°C to $+125^\circ\text{C}$.

Dissipation Factor:

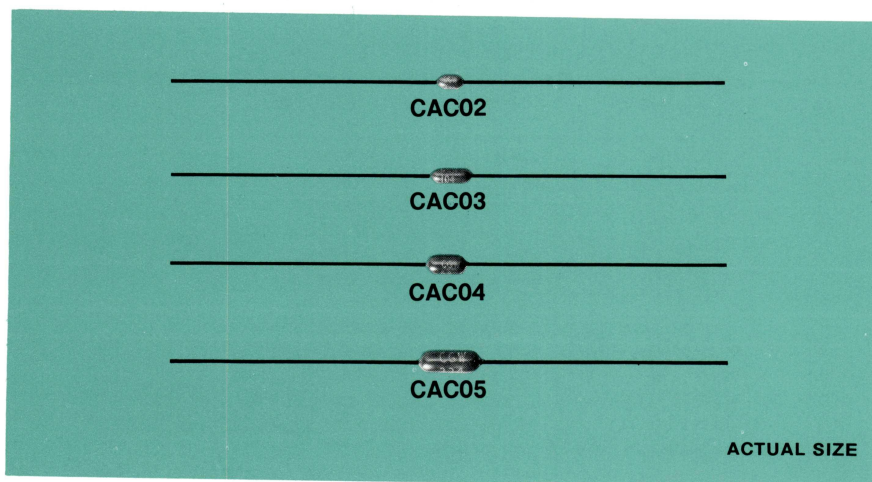
0.1% Maximum at 1 KHz

Insulation Resistance:

100,000 megohms

Dielectric Strength:

2.5 times rated voltage for 1 to 5 seconds.



QUALITY ASSURANCE REQUIREMENTS:

Our Spinseal miniature monolithic capacitors are tested in accordance with EIA RS - 198. Each lot is inspected for:

- Capacitance
- Dissipation Factor
- Insulation Resistance
- Dielectric Strength
- Visual Examination

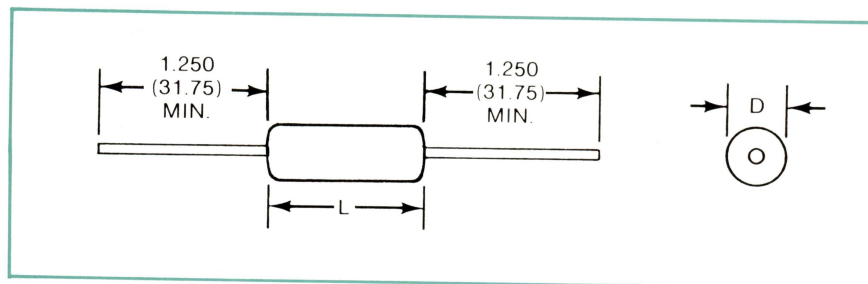


TABLE OF DIMENSIONS AND CAPACITANCE RANGE

Case Size	Dimensions — Inches (Millimeters) L MAX	D MAX	Lead Dia. $\pm .002$ (.05)	Voltage Rating	COG * Capacitance Range
CAC02	.170 (4.32)	.100 (2.54)	.020 (.51)	100 50	1 pF to 390 pF 390 pF to 750 pF
CAC03	.260 (6.60)	.100 (2.54)	.020 (.51)	100 50	330 pF to 1000 pF 1000 pF to 2200 pF
CAC04	.270 (6.86)	.150 (3.81)	.020 (.51)	100 50	820 pF to 2200 pF 2200 pF to 4700 pF
CAC05	.400 (10.16)	.150 (3.81)	.025 (.64)	100 50	1000 pF to 4700 pF 4700 pF to 10,000 pF

*Parts not shown on the ordering information chart are available, within the above range, upon request.

NOTE: All leads are solder coated Dumet.

PART NUMBERS AND ORDERING INFORMATION

CAC02 PART NUMBERS		CAC02 PART NUMBERS (cont'd.)		CAC03 PART NUMBERS		CAC04 PART NUMBERS (cont'd.)	
CAP.	100 VOLT	CAP.	100 VOLT	CAP.	100 VOLT	CAP.	50 VOLT
1.0pF	CAC02COG1R0 * 100A	43pF	CAC02COG430 * 100A	430pF	CAC03COG431 * 100A	2400pF	CAC04COG242 * 050A
1.5pF	CAC02COG1R5 — 100A	47pF	CAC02COG470 — 100A	470pF	CAC03COG471 — 100A	2700pF	CAC04COG272 — 050A
2.2pF	CAC02COG2R2 — 100A	51pF	CAC02COG510 — 100A	510pF	CAC03COG511 — 100A	3000pF	CAC04COG302 — 050A
2.7pF	CAC02COG2R7 — 100A	56pF	CAC02COG560 — 100A	560pF	CAC03COG561 — 100A	3300pF	CAC04COG332 — 050A
3.0pF	CAC02COG3R0 — 100A	62pF	CAC02COG620 — 100A	620pF	CAC03COG621 — 100A	3600pF	CAC04COG362 — 050A
3.3pF	CAC02COG3R3 — 100A	68pF	CAC02COG680 — 100A	680pF	CAC03COG681 — 100A	3900pF	CAC04COG392 — 050A
3.6pF	CAC02COG3R6 — 100A	75pF	CAC02COG750 — 100A	750pF	CAC03COG751 — 100A	4300pF	CAC04COG432 — 050A
3.9pF	CAC02COG3R9 — 100A	82pF	CAC02COG820 — 100A	820pF	CAC03COG821 — 100A	4700pF	CAC04COG472 — 050A
4.3pF	CAC02COG4R3 — 100A	91pF	CAC02COG910 — 100A	910pF	CAC03COG911 — 100A	CAC05 PART NUMBERS	
4.7pF	CAC02COG4R7 — 100A	100pF	CAC02COG101 — 100A	1000pF	CAC03COG102 — 100A		
5.1pF	CAC02COG5R1 — 100A	110pF	CAC02COG111 — 100A	CAP. 50 VOLT		CAP. 100 VOLT	
5.6pF	CAC02COG5R6 — 100A	120pF	CAC02COG121 — 100A			2400pF	CAC05COG242 * 100A
6.2pF	CAC02COG6R2 — 100A	130pF	CAC02COG131 — 100A	1100pF	CAC03COG112 * 050A	2700pF	CAC05COG272 — 100A
6.8pF	CAC02COG6R8 — 100A	150pF	CAC02COG151 — 100A	1200pF	CAC03COG122 — 050A	3000pF	CAC05COG302 — 100A
7.5pF	CAC02COG7R5 — 100A	160pF	CAC02COG161 — 100A	1300pF	CAC03COG132 — 050A	3300pF	CAC05COG332 — 100A
8.2pF	CAC02COG8R2 — 100A	180pF	CAC02COG181 — 100A	1500pF	CAC03COG152 — 050A	3600pF	CAC05COG362 — 100A
9.1pF	CAC02COG9R1 — 100A	200pF	CAC02COG201 — 100A	1600pF	CAC03COG162 — 050A	3900pF	CAC05COG392 — 100A
10pF	CAC02COG100 — 100A	220pF	CAC02COG221 — 100A	1800pF	CAC03COG182 — 050A	4300pF	CAC05COG432 — 100A
11pF	CAC02COG110 — 100A	240pF	CAC02COG241 — 100A	2000pF	CAC03COG202 — 050A	4700pF	CAC05COG472 — 100A
12pF	CAC02COG120 — 100A	270pF	CAC02COG271 — 100A	2200pF	CAC03COG222 — 050A	CAP. 50 VOLT	
13pF	CAC02COG130 — 100A	300pF	CAC02COG301 — 100A	CAC04 PART NUMBERS			
15pF	CAC02COG150 — 100A	330pF	CAC02COG331 — 100A			CAP. 100 VOLT	
16pF	CAC02COG160 — 100A	360pF	CAC02COG361 — 100A	1100pF	CAC04COG112 * 100A	5100pF	CAC05COG512 * 050A
18pF	CAC02COG180 — 100A	390pF	CAC02COG391 — 100A	1200pF	CAC04COG122 — 100A	5600pF	CAC05COG562 — 050A
20pF	CAC02COG200 — 100A	CAP. 50 VOLT		1300pF	CAC04COG132 — 100A	6200pF	CAC05COG622 — 050A
22pF	CAC02COG220 — 100A	430pF	CAC02COG431 * 050A	1500pF	CAC04COG152 — 100A	6800pF	CAC05COG682 — 050A
24pF	CAC02COG240 — 100A	470pF	CAC02COG471 — 050A	1600pF	CAC04COG162 — 100A	7500pF	CAC05COG752 — 050A
27pF	CAC02COG270 — 100A	510pF	CAC02COG511 — 050A	1800pF	CAC04COG182 — 100A	8200pF	CAC05COG822 — 050A
30pF	CAC02COG300 — 100A	560pF	CAC02COG561 — 050A	2000pF	CAC04COG202 — 100A	9100pF	CAC05COG912 — 050A
33pF	CAC02COG330 — 100A	620pF	CAC02COG621 — 050A	2200pF	CAC04COG222 — 100A	10,000pF	CAC05COG103 — 050A
36pF	CAC02COG360 — 100A	680pF	CAC02COG681 — 050A	*Insert letter for tolerance code. See part number explanation for values. Available tolerances are: 1.0 - 4.7 pF — C, D 5.1 - 12.0 pF — C, J, K 13 - 24 pF — C, G, J, K, M, 27 pF - Up — F, G, J, K, M,			
39pF	CAC02COG390 — 100A	750pF	CAC02COG751 — 050A				

Ceramic Capacitors

CORNING

CKR11, 12, 14 (QPL to MIL-C-39014/5)
Established Reliability

APPLICATIONS

These miniature multilayer ceramic capacitors are QPL to Established Reliability specification MIL-C-39014/5. The dielectric is fused into a monolithic structure, which is then molded into a tough, flame retardant case, sized for automatic insertion. These units offer excellent frequency characteristics, superior voltage coefficients and high volumetric efficiency.

PERFORMANCE CHARACTERISTICS

Tolerance — $\pm 20\%$ and $\pm 10\%$.

Stability Characteristics — Available as follows:

BX — TC: $\pm 15\%$; TVC: +15, -25%

BR — TC: $\pm 15\%$; TVC: +15, -40%

Dissipation Factor — 2.5% maximum.

Insulation Resistance — At 25°C, 100,000 megohms or 1,000 megohm-microfarads. At 125°C, 10,000 megohms or 100 megohm-microfarads.

Voltage/Temperature Ratings — Voltage ratings are shown in the decade tables. The operating temperature range is -55°C to +125°C.

Part Numbers — Part numbers are formed by adding a dash number from the part number table to the basic mil spec number — M39014/05 — (add dash number)

Examples:

M39014/05-2601

CKR11 10pF $\pm 10\%$ 100V

M Failure Rate (BX Characteristic)

M39014/05-2898

CKR14 100,000 pF $\pm 20\%$ 100V

P Failure Rate (BR Characteristic)

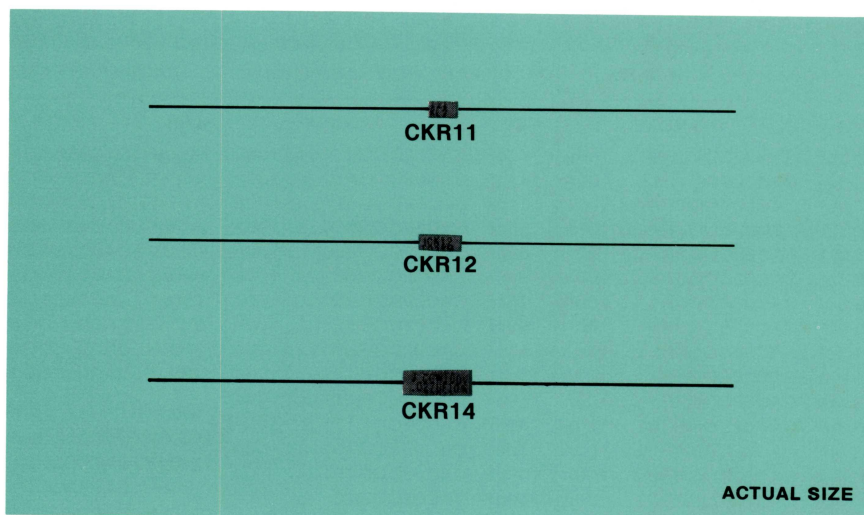
M39014/05-2062

CKR12 10,000 pF $\pm 20\%$ 100V

R Failure Rate (BX Characteristic)

Cross-Reference Information

MIL-C-39014/5	MIL-C-11015/20
Style	Style
CKR11	CK12
CKR12	CK13
CKR14	CK14



ACTUAL SIZE

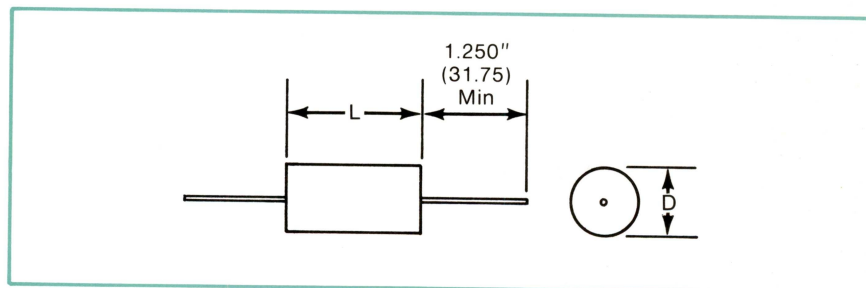
Failure Rate (90% Confidence)

M = 1%/1000 Hours

P = .1%/1000 Hours

R = .01%/1000 Hours

S = .001%/1000 Hours



Dimensions — Inches (Millimeters)

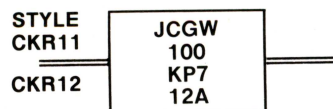
Case Size	L $\pm .010$ ($\pm .25$)	D $\pm .010$ ($\pm .25$)	Lead Dia. $\pm .001$ (.030)	Weight (Grams)
CKR11	.160 (4.06)	.090 (2.29)	.019 (.48)	.2
CKR12	.250 (6.35)	.090 (2.29)	.019 (.48)	.2
CKR14	.390 (9.91)	.140 (3.56)	.025 (.63)	.5

Note — Leads are solder coated Dumet.

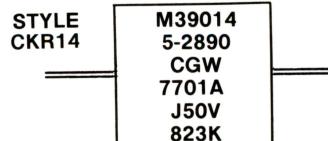
PART NUMBERS AND ORDERING INFORMATION

M39014/05 — (Dash Number) Failure Rate Level — (%/1,000 hours) 1.0(M) 0.1(P) 0.01(R) 0.001(S)				Capacitance Value (pF)	Capacitance Tolerance ± Percent	DC Rated Voltage	M39014/05 — (Dash Number) Failure Rate Level — (%/1,000 hours) 1.0(M) 0.1(P) 0.01(R) 0.001(S)				Capacitance Value (pF)	Capacitance Tolerance ± Percent	DC Rated Voltage
Style CKR11 BX							Style CKR12 BX						
2601	2801	2001	2201	10	10	100	2657	2857	2057	2257	5600	10	100
2602	2802	2002	2202	10	20	100	2658	2858	2058	2258	6800	10	100
2603	2803	2003	2203	12	10	100	2659	2859	2059	2259	6800	20	100
2604	2804	2004	2204	15	10	100	2660	2860	2060	2260	8200	10	100
2605	2805	2005	2205	15	20	100	2661	2861	2061	2261	10000	10	100
2606	2806	2006	2206	18	10	100	2662	2862	2062	2262	10000	20	100
2607	2807	2007	2207	22	10	100	2663	2863	2063	2263	12000	10	50
2608	2808	2008	2208	22	20	100	2664	2864	2064	2264	15000	10	50
2609	2809	2009	2209	27	10	100	2665	2865	2065	2265	15000	20	50
2610	2810	2010	2210	33	10	100	2666	2866	2066	2266	18000	10	50
2611	2811	2011	2211	33	20	100	2667	2867	2067	2267	22000	10	50
2612	2812	2012	2212	39	10	100	2668	2868	2068	2268	22000	20	50
2613	2813	2013	2213	47	10	100	2669	2869	2069	2269	27000	10	50
2614	2814	2014	2214	47	20	100	2670	2870	2070	2270	33000	10	50
2615	2815	2015	2215	56	10	100	2671	2871	2071	2271	33000	20	50
2616	2816	2016	2216	68	10	100	2672	2872	2072	2272	39000	10	50
2617	2817	2017	2217	68	20	100	2673	2873	2073	2273	47000	10	50
2618	2818	2018	2218	82	10	100	2674	2874	2074	2274	47000	20	50
2619	2819	2019	2219	100	10	100	Style CKR14 BX						
2620	2820	2020	2220	100	20	100	2675	2875	2075	2275	12000	10	100
2621	2821	2021	2221	120	10	100	2676	2876	2076	2276	15000	10	100
2622	2822	2022	2222	150	10	100	2677	2877	2077	2277	15000	20	100
2623	2823	2023	2223	150	20	100	2678	2878	2078	2278	18000	10	100
2624	2824	2024	2224	180	10	100	2679	2879	2079	2279	22000	10	100
2625	2825	2025	2225	220	10	100	2680	2880	2080	2280	22000	20	100
2626	2826	2026	2226	220	20	100	2681	2881	2081	2281	27000	10	100
2627	2827	2027	2227	270	10	100	2682	2882	2082	2282	33000	10	100
2628	2828	2028	2228	330	10	100	2683	2883	2083	2283	33000	20	100
2629	2829	2029	2229	330	20	100	2684	2884	2084	2284	39000	10	100
2630	2830	2030	2230	390	10	100	2685	2885	2085	2285	47000	10	100
2631	2831	2031	2231	470	10	100	2686	2886	2086	2286	47000	20	100
2632	2832	2032	2232	470	20	100	2687	2887	2087	2287	56000	10	50
2633	2833	2033	2233	560	10	100	2688	2888	2088	2288	68000	10	50
2634	2834	2034	2234	680	10	100	2689	2889	2089	2289	68000	20	50
2635	2835	2035	2235	680	20	100	2690	2890	2090	2290	82000	10	50
2636	2836	2036	2236	820	10	100	2691	2891	2091	2291	100000	10	50
2637	2837	2037	2237	1000	10	100	2692	2892	2092	2292	100000	20	50
2638	2838	2038	2238	1000	20	100	Style CKR14 BR						
2639	2839	2039	2239	1200	10	100	2693	2893	2093	2293	56000	10	100
2640	2840	2040	2240	1500	10	100	2694	2894	2094	2294	68000	10	100
2641	2841	2041	2241	1500	20	100	2695	2895	2095	2295	68000	20	100
2642	2842	2042	2242	1800	10	100	2696	2896	2096	2296	82000	10	100
2643	2843	2043	2243	2200	10	100	2697	2897	2097	2297	100000	10	100
2644	2844	2044	2244	2200	20	100	2698	2898	2098	2298	100000	20	100
2645	2845	2045	2245	2700	10	100	2699	2899	2099	2299	120000	10	50
2646	2846	2046	2246	3300	10	100	2700	2900	2100	2300	150000	10	50
2647	2847	2047	2247	3300	20	100	2701	2901	2101	2301	150000	20	50
2648	2848	2048	2248	3900	10	100	2702	2902	2102	2302	180000	10	50
2649	2849	2049	2249	4700	10	100	2703	2903	2103	2303	220000	10	50
2650	2850	2050	2250	4700	20	100	2704	2904	2104	2304	220000	20	50
2651	2851	2051	2251	5600	10	50	2705	2905	2105	2305	270000	10	50
2652	2852	2052	2252	6800	10	50							
2653	2853	2053	2253	6800	20	50							
2654	2854	2054	2254	8200	10	50							
2655	2855	2055	2255	10000	10	50							
2656	2856	2056	2256	10000	20	50							

PART MARKING



J — JAN Trademark
CGW — Corning Glass Works
100 — Capacitance, Code in pF (10pF)
K — Capacitance Tolerance (±10%)
P — Failure Rate Level
(.1%/1000 hrs.)
7 — Last Digit of Year
12 — Week of Year
A — Lot Code



M39014 — General Specification
5 — Specification Sheet
2890 — Dash Number
CGW — Corning Glass Works
77 — Year
01 — Week
A — Lot Code
J — JAN Trademark
50V — Voltage Rating
823 — Coded Capacitance
K — Capacitance Tolerance

Ceramic Capacitors

CK12, 13, 14 (QPL to MIL-C-11015/20)

CORNING

APPLICATIONS

These miniature multilayer ceramic capacitors are QPL to MIL-C-11015/20. These units provide high volumetric efficiency and superior reliability. The monolithic units are molded into rugged flame-retardant cases, ideally suited for automatic insertion.

PERFORMANCE CHARACTERISTICS

Tolerance — $\pm 20\%$ and $\pm 10\%$.

Stability Characteristics — Available as follows:

BX — TC: $\pm 15\%$; TVC: +15, -25%

BR — TC: $\pm 15\%$; TVC: +15, -40%

Dissipation Factor — 2.5% maximum @ 1 kHz.

Life — Meets or exceeds requirements of MIL-C-11015, 200% of rated voltage, 125°C, for 2,000 hours.

Insulation Resistance — 100,000 megohms or 1,000 megohm-microfarads.

Voltage/Temperature Ratings — Voltage ratings are shown in the decade table. The operating temperature range is -55°C to +125°C.

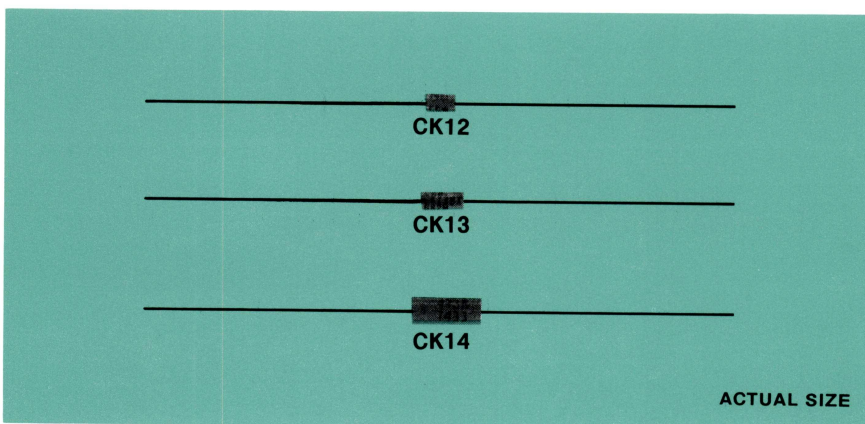
Moisture Resistance — Meets or exceeds requirements of MIL-C-11015 and MIL-STD-202, Method 106.

Dielectric Withstanding Voltage — 250% of rated dc voltage.

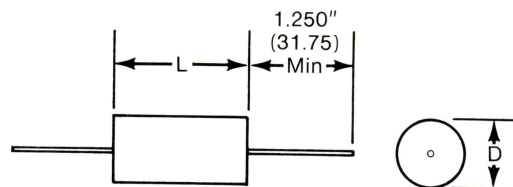
Part Numbers — Part numbers are shown in the ordering information table. Use suffix "M" for $\pm 20\%$ tolerance if available, and suffix "K" for $\pm 10\%$ tolerance.

Cross-Reference Information

MIL-C-11015/20	MIL-C-39014/5
Style	Style
CK12	CKR11
CK13	CKR12
CK14	CKR14



ACTUAL SIZE



Dimensions — Inches (Millimeters)

Case Size	L $\pm .010$ ($\pm .25$)	D $\pm .010$ ($\pm .25$)	Lead Dia. $\pm .001$ (.030)	Weight (Grams)
CK12	.160 (4.06)	.090 (2.29)	.019 (.48)	.2
CK13	.250 (6.35)	.090 (2.29)	.019 (.48)	.2
CK14	.390 (9.91)	.140 (3.56)	.025 (.63)	.5

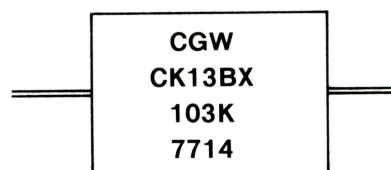
Note — Leads are solder coated Dumet.

PART NUMBERS AND ORDERING INFORMATION

Capacitance Values (pF)	Military Type Designation	DC Working Voltage	Tolerances Available	Capacitance Values (pF)	Military Type Designation	DC Working Voltage	Tolerances Available
STANDARD VALUES CK12				STANDARD VALUES CK12 (con't.)			
10	CK12BX100 *	100	K,M	6800	CK12BX682 *	50	K,M
12	CK12BX120 —	100	K	8200	CK12BX822 —	50	K
15	CK12BX150 —	100	K,M	10000	CK12BX103 —	50	K,M
18	CK12BX180 —	100	K	STANDARD VALUES CK13			
22	CK12BX220 —	100	K,M	5600	CK13BX562 *	100	K
27	CK12BX270 —	100	K	6800	CK13BX682 —	100	K,M
33	CK12BX330 —	100	K,M	8200	CK13BX822 —	100	K
39	CK12BX390 —	100	K	10000	CK13BX103 —	100	K,M
47	CK12BX470 —	100	K,M	12000	CK13BX123 —	50	K
56	CK12BX560 —	100	K	15000	CK13BX153 —	50	K,M
68	CK12BX680 —	100	K,M	18000	CK13BX183 —	50	K
82	CK12BX820 —	100	K	22000	CK13BX223 —	50	K,M
100	CK12BX101 —	100	K,M	27000	CK13BR273 —	50	K
120	CK12BX121 —	100	K	33000	CK13BR333 —	50	K,M
150	CK12BX151 —	100	K,M	39000	CK13BR393 —	50	K
180	CK12BX181 —	100	K	47000	CK13BR473 —	50	K,M
220	CK12BX221 —	100	K,M	STANDARD VALUES CK14			
270	CK12BX271 —	100	K	12000	CK14BX123 *	100	K
330	CK12BX331 —	100	K,M	15000	CK14BX153 —	100	K,M
390	CK12BX391 —	100	K	18000	CK14BX183 —	100	K
470	CK12BX471 —	100	K,M	22000	CK14BX223 —	100	K,M
560	CK12BX561 —	100	K	27000	CK14BX273 —	100	K
680	CK12BX681 —	100	K,M	33000	CK14BX333 —	100	K,M
820	CK12BX821 —	100	K	39000	CK14BX393 —	100	K
1000	CK12BX102 —	100	K,M	47000	CK14BX473 —	100	K,M
1200	CK12BX122 —	100	K	56000	CK14BR563 —	100	K
1500	CK12BX152 —	100	K,M	68000	CK14BR683 —	100	K,M
1800	CK12BX182 —	100	K	82000	CK14BR823 —	100	K
2200	CK12BX222 —	100	K,M	100000	CK14BR104 —	100	K,M
2700	CK12BX272 —	100	K	120000	CK14BR124 —	50	K
3300	CK12BX332 —	100	K,M	150000	CK14BR154 —	50	K,M
3900	CK12BX392 —	100	K	180000	CK14BR184 —	50	K
4700	CK12BX472 —	100	K,M	220000	CK14BR224 —	50	K,M
5600	CK12BX562 —	50	K	270000	CK14BR274 —	50	K

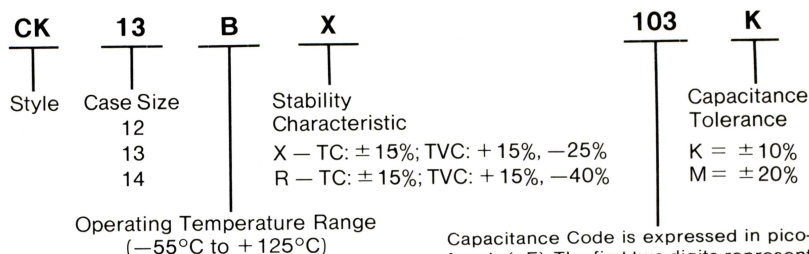
*Insert M or K for tolerance code above lines.

PART MARKING



CGW — Corning Glass Works
 CK — Style
 13 — Case Size
 B — Operating Temperature Range
 X — Stability Characteristic
 103 — Capacitance
 K — Tolerance
 7714 — Date and Lot Code

MILITARY PART NUMBER EXPLANATION



GLASS-K™ Capacitors

CORNING

CKR31, 32 (QPL to MIL-C-39014/21)
Established Reliability

APPLICATIONS

These miniature multilayer ceramic capacitors, CORNING® style CKR31 and CKR32 are qualified to Established Reliability specification MIL-C-39014/21. High volumetric efficiency and reliable performance result from the special GLASS-K™ dielectric, which is fused into a compact monolithic structure, sized for automatic insertion. These capacitors are available in three different stability characteristics.

PERFORMANCE CHARACTERISTICS

Tolerance — $\pm 20\%$ and $\pm 10\%$ in characteristics "U" and "V", and $\pm 10\%$ and $\pm 5\%$ in characteristic "T".

Stability Characteristics — Available as follows:

BT-TC: $+2, -10\%$; TVC: $+2, -10\%$
BU-TC: $+2, -15\%$; TVC: $+2, -15\%$
BV-TC: $+20, -45\%$; TVC: $+20, -50\%$

Dissipation Factor:

BT: $\leq 1.0\%$
BU: $\leq 1.5\%$
BV: $\leq 3.0\%$

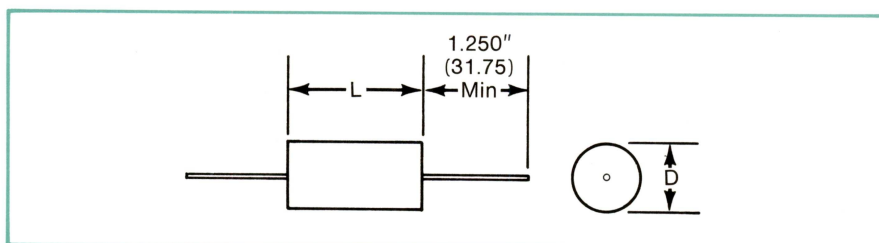
Life — Meets or exceeds requirements of MIL-C-39014. At 200% of rated voltage, 125°C , at 4000 hours, the capacitance change for each stability characteristic is as follows:

BT: $\pm 5\%$
BU: $\pm 10\%$
BV: $\pm 20\%$

Insulation Resistance — At 25°C , 100,000 megohms or 1,000 megohm-microfarads. At 125°C , 10,000 megohms or 100 megohm-microfarads.

Voltage/Temperature Ratings — Rated voltage is 50 Vdc. The operating temperature range is -55°C to $+125^\circ\text{C}$.

Moisture Resistance — Meets or exceeds requirements of MIL-C-39014 and MIL-STD-202, Method 106. The capacitance change is less than 2% for stability characteristics T and U, and less than 5% for characteristic V.



Dimensions — Inches (Millimeters)

Case Size	L $\pm .010$ (.254)	D $\pm .010$ (.254)	Lead Dia. $+.004$ (.10) $-.001$ (.03)	Weight (Grams) (Typ)
CKR31	.240 (6.09)	.090 (2.29)	.016 (.41)	.2
CKR32	.240 (6.09)	.130 (3.30)	.016 (.41)	.3

Note: Leads are gold-plated, solderable and weldable per MIL-STD-1276, Type D.

Quick Selection Guide

Capacitance — pF	Style CKR	Stability Char.
270 — 10,000	31	BT
12,000 — 20,000	31 32	BU BT
22,000 — 39,000	31 32	BV BU
47,000 — 51,000	31	BV
56,000 — 100,000	32	BV

PART NUMBERS AND ORDERING INFORMATION

M39014/21 (Dash Number)	Capacitance Value (pF)	Capacitance Tolerance ± Percent	DC Rated Voltage	M39014/21 (Dash Number)	Capacitance Value (pF)	Capacitance Tolerance ± Percent	DC Rated Voltage
Failure Rate Level (%/1,000 hours) 1.0(M)				Failure Rate Level (%/1,000 hours) 1.0(M)			
Style CKR31 BT				Style CKR31 BV			
0001	270	5	50	0049	22,000	10	50
0002	270	10	50	0050	22,000	20	50
0003	330	5	50	0051	27,000	10	50
0004	330	10	50	0052	27,000	20	50
0005	390	5	50	0053	33,000	10	50
0006	390	10	50	0054	33,000	20	50
0007	470	5	50	0055	39,000	10	50
0008	470	10	50	0056	39,000	20	50
0009	560	5	50	0057	47,000	10	50
0010	560	10	50	0058	47,000	20	50
0011	680	5	50	0059	51,000	10	50
0012	680	10	50	0060	51,000	20	50
0013	820	5	50	Style CKR32 BT			
0014	820	10	50	0061	12,000	5	50
0015	1000	5	50	0062	12,000	10	50
0016	1000	10	50	0063	15,000	5	50
0017	1200	5	50	0064	15,000	10	50
0018	1200	10	50	0065	18,000	5	50
0019	1500	5	50	0066	18,000	10	50
0020	1500	10	50	0067	20,000	5	50
0021	1800	5	50	0068	20,000	10	50
0022	1800	10	50	Style CKR32 BU			
0023	2200	5	50	0069	22,000	10	50
0024	2200	10	50	0070	22,000	20	50
0025	2700	5	50	0071	27,000	10	50
0026	2700	10	50	0072	27,000	20	50
0027	3300	5	50	0073	33,000	10	50
0028	3300	10	50	0074	33,000	20	50
0029	3900	5	50	0075	39,000	10	50
0030	3900	10	50	0076	39,000	20	50
0031	4700	5	50	Style CKR32 BV			
0032	4700	10	50	0077	56,000	10	50
0033	5600	5	50	0078	56,000	20	50
0034	5600	10	50	0079	62,000	10	50
0035	6800	5	50	0080	62,000	20	50
0036	6800	10	50	0081	68,000	10	50
0037	8200	5	50	0082	68,000	20	50
0038	8200	10	50	0083	75,000	10	50
0039	10000	5	50	0084	75,000	20	50
0040	10000	10	50	0085	82,000	10	50
Style CKR31 BU				0086	82,000	20	50
0041	12,000	10	50	0087	91,000	10	50
0042	12,000	20	50	0088	91,000	20	50
0043	15,000	10	50	0089	100,000	10	50
0044	15,000	20	50	0090	100,000	20	50
0045	18,000	10	50				
0046	18,000	20	50				
0047	20,000	10	50				
0048	20,000	20	50				

PART MARKING

JCK31
103KM
7713A
CGW

J — JAN Trademark
CK — Style
31 — Case Size
103 — Capacitance, Coded in pF
K — Tolerance
M — Failure Rate Level
7713 — Date
A — Lot Code
CGW — Corning Glass Works

PART NUMBER EXPLANATION

Part numbers are formed by adding a dash number from the part number table to the basic mil spec number — M39014/21 — (add dash number).
Example:

M39014/21-0040
CKR31 10,000pF ±10% 50V
M Failure Rate (BT Characteristic)

CROSS REFERENCE INFORMATION

MIL-C-39014/21
Style

CKR31
CKR32

MIL-C-11015/25
Style

CK31
CK32

GLASS-K™ Capacitors

CORNING

CK31, 32 (QPL to MIL-C-11015/25)

APPLICATIONS

These miniature multilayer ceramic capacitors, CORNING® style CK31 and CK32, meet or exceed all requirements of MIL-C-11015/25. High volumetric efficiency and reliable performance result from the special GLASS-K™ dielectric, which is fused into a compact monolithic structure, sized for automatic insertion. Available in three different stability characteristics, these capacitors are suitable for both military and commercial applications in miniature circuitry.

PERFORMANCE CHARACTERISTICS

Tolerance — $\pm 20\%$ and $\pm 10\%$ in characteristics "U" and "V", and $\pm 10\%$ and $\pm 5\%$ in characteristic "T".

Stability Characteristics — Available as follows:

BT-TC: +2, -10%; TVC: +2, -10%

BU-TC: +2, -15%; TVC: +2, -15%

BV-TC: +20, -45%; TVC: +20, -50%

Dissipation Factor:

BT: $\leq 1.0\%$

BU: $\leq 1.5\%$

BV: $\leq 3.0\%$

Life — Meets or exceeds requirements of MIL-C-11015. At 200% of rated voltage, 125°C, the maximum capacitance change for each stability characteristic is as follows:

BT: $\pm 2\%$

BU: $\pm 5\%$

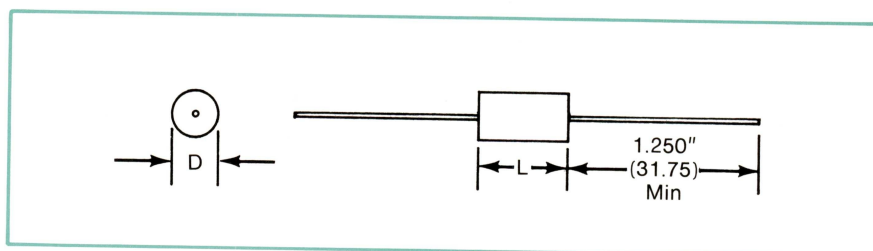
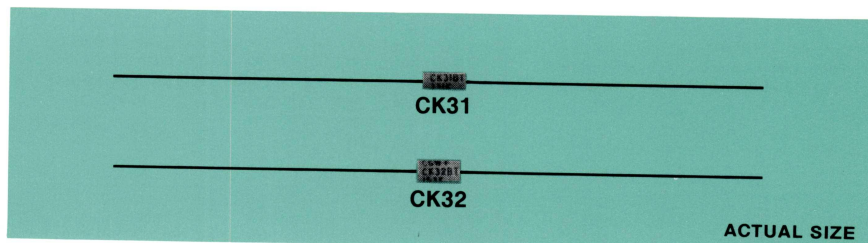
BV: $\pm 20\%$

Insulation Resistance — 100,000 megohms or 1,000 megohm-microfarads, whichever is less.

Voltage/Temperature Ratings

Rated voltage is 50 Vdc. The operating temperature range is -55°C to $+125^{\circ}\text{C}$.

Moisture Resistance — Meets or exceeds requirements of MIL-C-11015 and MIL-STD-202, Method 106. The capacitance change is less than 2% for stability characteristics T and U, and less than 5% for characteristic V.



Dimensions — Inches (Millimeters)

Case Size	L $\pm .010(.254)$	D $\pm .010(.254)$	Lead Dia. +.004 (.10) -.001 (.03)	WEIGHT (Grams) (Typ)
CK31	.240 (6.09)	.090 (2.29)	.016 (.41)	.2
CK32	.240 (6.09)	.130 (3.30)	.016 (.41)	.3

Note: Leads are gold-plated, solderable and weldable Dumet per MIL-STD-1276, Type D.

Quick Selection Guide

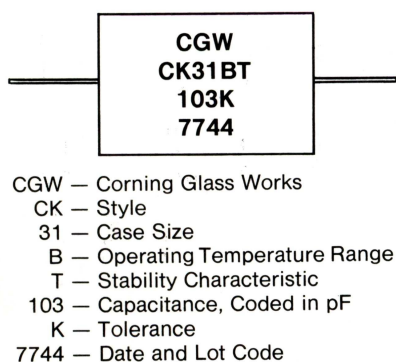
Capacitance — pF	Style CK	Stability Char.
270 — 10,000	31	BT
12,000 — 20,000	31 32	BU BT
22,000 — 39,000	31 32	BV BU
47,000 — 51,000	31	BV
56,000 — 100,000	32	BV

PART NUMBERS AND ORDERING INFORMATION

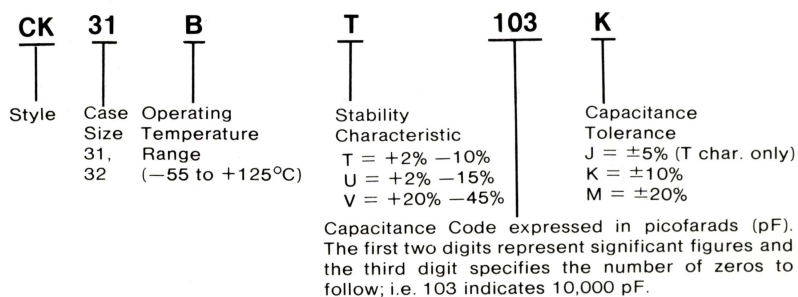
Capacitance Value (pF)	Military Type Designation	DC Working Voltage	Tolerances Available	Capacitance Value (pF)	Military Type Designation	DC Working Voltage	Tolerances Available
STANDARD VALUES CK31				STANDARD VALUES CK31 (Cont.)			
270	CK31BT271 *	50	J, K	22000	CK31BV223 *	50	K, M
330	CK31BT331	50	J, K	27000	CK31BV273	50	K, M
390	CK31BT391	50	J, K	33000	CK31BV333	50	K, M
470	CK31BT471	50	J, K	39000	CK31BV393	50	K, M
560	CK31BT561	50	J, K	47000	CK31BV473	50	K, M
680	CK31BT681	50	J, K	51000	CK31BV513	50	K, M
820	CK31BT821	50	J, K	STANDARD VALUES CK32			
1000	CK31BT102	50	J, K	12000	CK32BT123 *	50	J, K
1200	CK31BT122	50	J, K	15000	CK32BT153	50	J, K
1500	CK31BT152	50	J, K	18000	CK32BT183	50	J, K
1800	CK31BT182	50	J, K	20000	CK32BT203	50	J, K
2200	CK31BT222	50	J, K	22000	CK32BU223 *	50	K, M
2700	CK31BT272	50	J, K	27000	CK32BU273	50	K, M
3300	CK31BT332	50	J, K	33000	CK32BU333	50	K, M
3900	CK31BT392	50	J, K	39000	CK32BU393	50	K, M
4700	CK31BT472	50	J, K	56000	CK32BV563 *	50	K, M
5600	CK31BT562	50	J, K	62000	CK32BV623	50	K, M
6800	CK31BT682	50	J, K	68000	CK32BV683	50	K, M
8200	CK31BT822	50	J, K	75000	CK32BV753	50	K, M
10000	CK31BT103	50	J, K	82000	CK32BV823	50	K, M
12000	CK31BU123 *	50	K, M	91000	CK32BV913	50	K, M
15000	CK31BU153	50	K, M	100000	CK32BV104	50	K, M
18000	CK31BU183	50	K, M				
20000	CK31BU203	50	K, M				

*Add Letter for Tolerance Code above line: J = $\pm 5\%$, K = $\pm 10\%$, M = $\pm 20\%$.

PART MARKING



PART NUMBER EXPLANATION



Introduction to Solid Tantalum Capacitors

CORNING

CORNING® solid tantalum capacitors are manufactured by Components, Incorporated, a wholly owned subsidiary of Corning Glass Works.

Corning offers a broad line of micro-miniature solid tantalum capacitors which are available in a variety of shapes, sizes, and styles.

The microminiature MINITAN® capacitors, encased in polyester sleeves and sealed with special moisture-resistant, epoxy resin, are used where space is a premium. A very favorable capacitance to volume ratio makes them especially well suited for high-density applications. Both the cylin-

drical Cordwood series and the rectangular Modular series are available in both polar and non-polar construction with either axial or radial leads.

The MK series chip capacitors have a unique metal can construction which provides a high degree of environmental and physical protection to the tantalum anode. In addition, a co-planar positive termination design makes the MK chip ideally suited for simple, vibratory feed, auto-insertion systems.

Available with either a solder coat or a gold plate, the MK chip is suitable for solder reflow, conductive epoxy or ball-

bonding techniques.

The MINIDIP MD series features sub-miniature tantalum anodes, sealed in high stability moisture resistant epoxy. These radial leaded capacitors offer subminiature size and superior performance and are specifically intended for commercial and industrial applications.

Specials Capability — Corning has the capability to prototype and produce solid tantalum capacitors in speciality configurations. Contact Customer Engineering in Biddeford, Maine for special product needs.

PERFORMANCE CURVES FOR SOLID TANTALUM CAPACITORS

Ripple Voltage vs Temperature and Frequency — Ripple voltage must be limited to keep internal heating within allowable limits. Maximum ripple voltage vs frequency is specified in the curves on the product pages. For 125°C rated products, linearly derate the maximum ripple voltage above 25°C to 33% at 125°C. For 85°C rated products, linearly derate the maximum ripple voltage above 25°C to 60% at 85°C.

Impedance vs Frequency — Typical impedance vs frequency curves are

shown on the product pages. At the higher frequencies it is necessary to correct for resistance and reactance of the measuring equipment to achieve valid results.

WVDC vs Temperature — The product tables specify working voltage at ambient temperatures up to 85°C. Above 85°C, working voltage must be linearly derated to $\frac{2}{3}$ WVDC at 125°C for those products rated for 125°C operation.

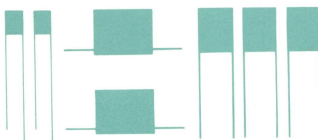
DC Leakage vs Temperature and Voltage — In general, DCL increases

with an increase in either temperature or voltage. The characteristic is quite similar for all solid tantalum capacitors; thus, the normalized curves can be used quite successfully. Since product leakage specifications are referenced to rated WVDC and 25°C, the curves are normalized with respect to this value. The curves show typical leakage at various voltages and temperatures with respect to the actual value at 25°C and rated WVDC.

SOLID TANTALUM CAPACITORS

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For the following:

- Placement of orders
 - Price quotations
 - Delivery
 - Specifications or drawing reviews
 - Samples
 - Location of a franchised distributor
-
- Technical information
 - Product capabilities
 - Applications assistance

Contact:**Customer Service**

Components, Incorporated
 313 Elm Street
 Biddeford, ME 04005
 (207) 282-5111
 TWX — 710-229-1550

Customer Engineering

Components, Incorporated
 313 Elm Street
 Biddeford, ME 04005
 (207) 282-5111
 TWX — 710-229-1550

PERFORMANCE CURVES FOR SOLID TANTALUM CAPACITORS

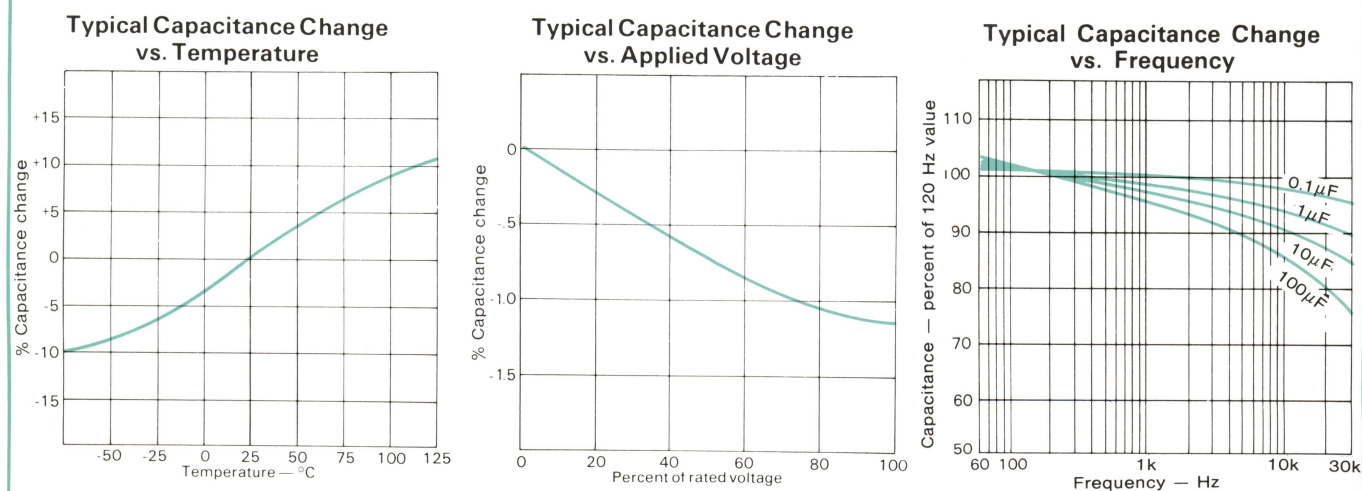
Capacitance vs Temperature, Voltage, and Frequency—Nominal capacitance as specified for each product is measured at 25°C with a maximum dc bias of 2.2 volts and a maximum ac signal of 1 vrms. Since these are seldom the actual operating conditions, the graphs show typical capacitance change vs temperature, voltage, and frequency. These characteristics are

somewhat variable with capacitance value, case size, and working voltage, but the referenced curves give a good indication of direction and magnitude of typical capacitance change.

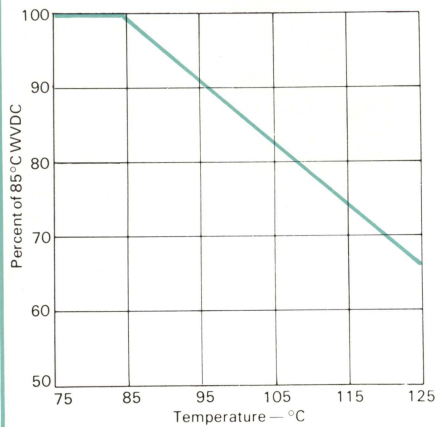
Dissipation Factor and ESR vs Frequency and Voltage—Product limits for dissipation factor are specified under the same measurement con-

ditions as used for capacitance. Although ESR (equivalent series resistance) is not specified, it can be calculated from capacitance and DF.

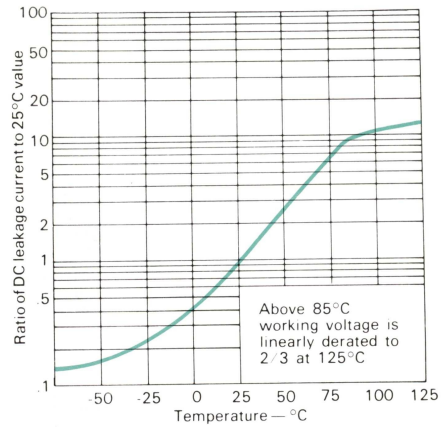
Dissipation factor at voltages and frequencies other than those specified can be determined from the graphs. ESR vs frequency, normalized with respect to the 120 hz value, is also shown.



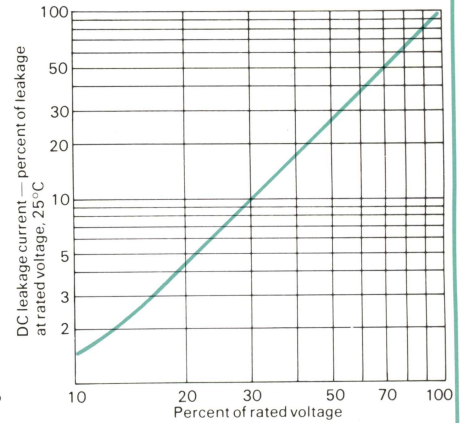
**Maximum Rated Voltage
vs. Temperature**



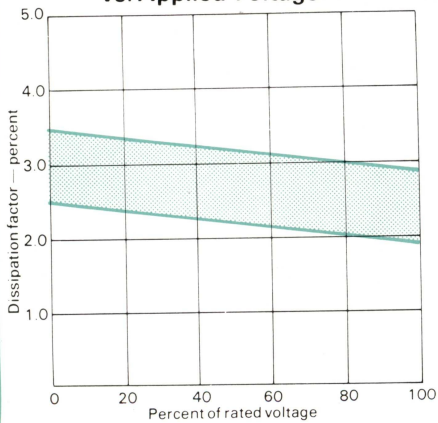
**Typical DC Leakage Current
vs. Temperature**



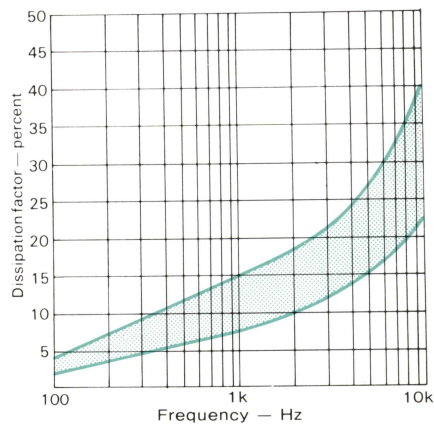
**Typical DC Leakage
Current vs. Applied Voltage**



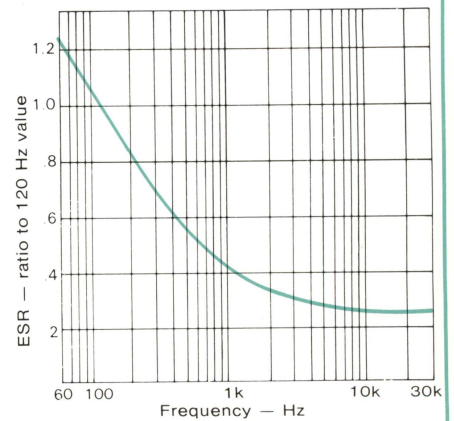
**Typical Dissipation Factor
vs. Applied Voltage**



Dissipation Factor vs. Frequency



Normalized ESR vs. Frequency



Solid Tantalum Capacitors

CORNING

MICROMINIATURE MINITAN[®] MODULAR MM SERIES

FOR FILTERING • COUPLING • BY-PASSING • TIMING

CORNING[®] solid tantalum capacitors are manufactured by Components Incorporated, a wholly owned subsidiary of Corning Glass Works.

These precision, microminiature polar capacitors are suitable for general filtering, coupling, by-passing, and noncritical RC timing applications to +85°C without derating and to +125°C with derating to ⅓ WVDC (Except MMW case size). Very favorable capacitance to volume ratios make them especially well suited to high density applications such as found in avionics systems, subminiature communications equipment, and thick film circuitry.

PERFORMANCE CHARACTERISTICS

Capacitance — Measured at +25°C and 120Hz on a polarized capacitance bridge with a maximum polarizing voltage of 2.2 vdc and a maximum ac signal of 1.0 volts rms.

Tolerance — Except for the MMW and MMU case sizes, standard tolerance is $\pm 20\%$ with $\pm 10\%$ or $\pm 5\%$ tolerance available in all case sizes ($\pm 5\%$ tolerance available for capacitance values of .01MFD or greater). 10% capacitance decade values are offered in $\pm 10\%$ or $\pm 5\%$ tolerance.

Dissipation Factor — Measured simultaneously with capacitance as above. See Part Number Table for maximum +25°C, 120 Hz values.

DC Leakage Current — With rated WVDC applied through a 1000 ohm resistor for a maximum of 5 minutes, at 25°C. DCL values in μA will not exceed those shown in the part number section.

at 85°C — 10 times the value

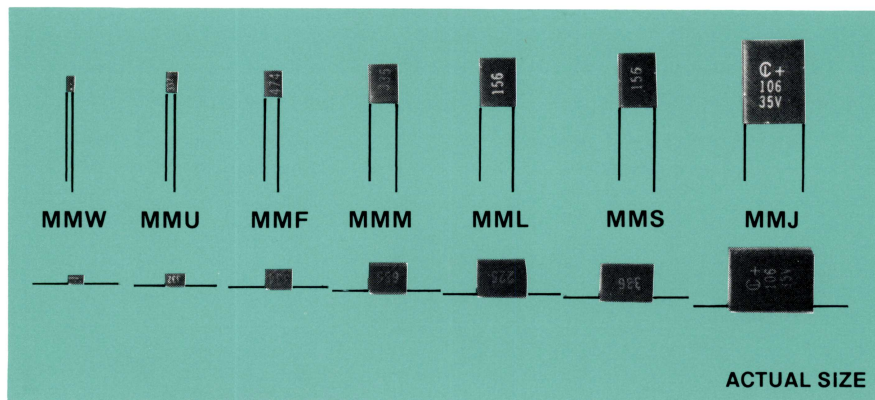
at 125°C — 15 times the value at ($\frac{1}{2}$ rated voltage).

Operating Voltage — Capacitors will operate reliably up to rated WVDC at +85°C and to +125°C with linear derating to ⅓ WVDC (With the exception of the MMW case size which is limited to +85°C operation). Capacitors will withstand peak voltages in the reverse direction equal to 15% of the dc rating at +25°C, 10% at +55°C, and 5% at +85°C. Ac ripple voltage should be limited so that the forward dc voltage plus peak ac voltage does not exceed rated WVDC.

Surge Voltage — At +85°C and at 60-second intervals, capacitors withstand 1000 30-second applications at 130% rated WVDC.

Temperature — No derating is required between -55°C and +85°C. Between +85°C and +125°C, derate linearly to ⅓ WVDC (With the exception of the MMW case size which is limited to +85°C operation).

Moisture Resistance — Following Method 106, MIL-STD-202 testing, capacitors will meet initial dc leakage requirements. Capacitance will be within $\pm 10\%$ of initial values.



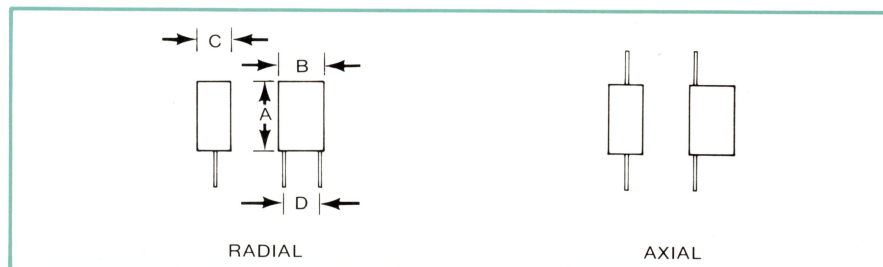
Life Test — After 2000 hours at +85°C with rated WVDC applied, capacitors will meet initial dc leakage and DF requirements. Capacitance will not change more than $\pm 10\%$ from original values.

MECHANICAL

Construction — Tantalum pellets are encased in polyester sleeves and sealed with a special moisture resistant epoxy resin. This rugged, fully insulated package withstands a one minute application of a 100

volt potential applied between the leads shorted together and an encircling metal foil envelope.

Leads — Leads are solder coated pure nickel wire suitable for soldering or welding. Tested in accordance with MIL-C-55365, .007 diameter leads withstand an 8 oz. pull, .010 diameter leads a 1 lb. pull, and .016 diameter leads a 3 lb. pull. All lead diameters withstand 5 rotations twist.



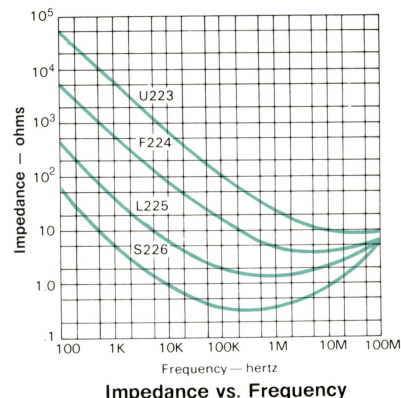
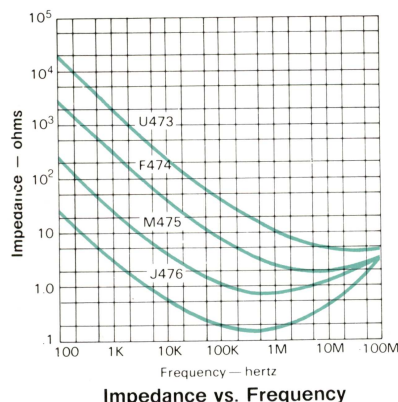
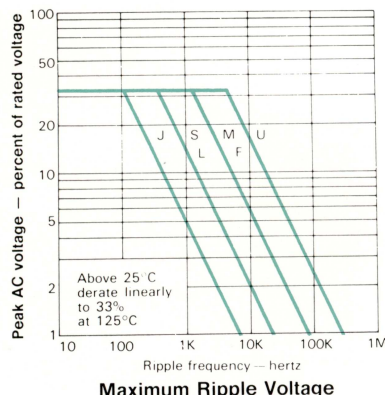
Dimensions — Inches (Millimeters)

Case Size	A Max.	B Max.	C Max.	D
MMW	.100 (2.54)	.050 (1.27)	.040 (1.02)	.030 (.76) $\pm .015 (\pm .38)$
MMU	.125 (3.18)	.070 (1.78)	.040 (1.02)	.050 (1.27) $\pm .015 (\pm .38)$
MMF	.165 (4.19)	.120 (3.05)	.070 (1.78)	.100 (2.54) $\pm .020 (\pm .51)$
MMM	.225 (5.72)	.185 (4.70)	.075 (1.91)	.150 (3.81) $\pm .020 (\pm .51)$
MML	.290 (7.37)	.220 (5.59)	.110 (2.79)	.180 (4.57) $\pm .025 (\pm .64)$
MMS	.310 (7.87)	.230 (5.84)	.130 (3.30)	.200 (5.08) $\pm .025 (\pm .64)$
MMJ	.475 (12.07)	.375 (9.53)	.150 (3.81)	.300 (7.62) $\pm .025 (\pm .64)$

Leads: W leads are 33 AWG, .007 $\pm$.001 (.18 $\pm$.025) diameter
 U, F, M leads are 30 AWG, .010 $\pm$.002 (.25 $\pm$.051) diameter
 L, S, J leads are 26 AWG, .016 $\pm$.002 (.41 $\pm$.051) diameter
 All anode leads are 1.625 $\pm$.125 (41.3 $\pm$ 3.18) long
 All cathode leads are 1.375 $\pm$.125 (34.9 $\pm$ 3.18) long

Solid Tantalum Capacitors

CORNING



PART NUMBERS AND ORDERING INFORMATION

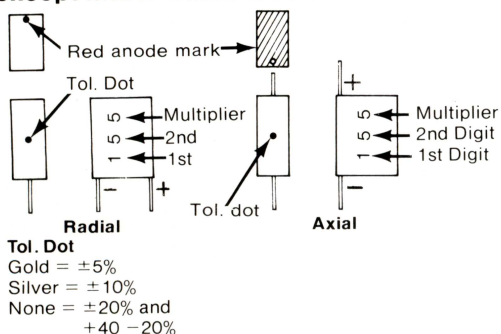
P/N	μF Cap.	Max. WVDC	Max. % DF	Max. DCL	P/N	μF Cap.	Max. WVDC	Max. % DF	Max. DCL	P/N	μF Cap.	Max. WVDC	Max. % DF	Max. DCL
W Case Size					F Case Size					L Case Size				
MMW-020-472 ±.5%	.0047	20	10	0.5	MMF-035-472 ±.5%	.0047	35	6	0.5	MML-035-225 ±.5%	2.2	35	6	2.0
MMW-020-682 ---	.0068	20	10	0.5	MMF-035-682 ---	.0068	35	6	0.5	MML-035-335 ---	3.3	35	6	2.0
MMW-020-103 ---	.010	20	10	0.5	MMF-035-103 ---	.010	35	6	0.5	MML-035-475 ---	4.7	35	6	2.0
MMW-020-153 ---	.015	20	10	0.5	MMF-035-153 ---	.015	35	6	0.5	MML-025-685 ---	6.8	25	6	2.0
MMW-020-223 ---	.022	20	10	0.5	MMF-035-223 ---	.022	35	6	0.5	MML-020-106 ---	10	20	6	2.0
MMW-020-333 ---	.033	20	10	0.5	MMF-035-333 ---	.033	35	6	0.5	MML-015-156 ---	15	15	6	2.0
MMW-020-473 ---	.047	20	10	0.5	MMF-035-473 ---	.047	35	6	0.5	MML-010-226 ---	22	10	6	2.0
MMW-020-683 ---	.068	20	10	0.5	MMF-035-683 ---	.068	35	6	0.5	MML-006-336 ---	33	6	6	2.0
MMW-015-104 ---	.10	15	10	0.5	MMF-035-104 ---	.10	35	6	0.5	MML-004-476 ---	47	4	8	2.0
MMW-010-154 ---	.15	10	10	0.5	MMF-035-154 ---	.15	35	6	0.5					
MMW-006-224 ---	.22	6	10	0.5	MMF-035-224 ---	.22	35	6	0.5	S Case Size				
MMW-004-334 ---	.33	4	10	0.5	MMF-035-334 ---	.33	35	6	0.5	MMS-035-685 ±.5%	6.8	35	6	3.0
MMW-002-474 ---	.47	2	10	0.5	MMF-035-474 ---	.47	35	6	0.5	MMS-025-106 ---	10	25	6	3.0
U Case Size					MMF-025-684 ---	.68	25	6	0.5	MMS-020-156 ---	15	20	6	3.0
MMU-020-102 ±.5%	.0010	20	6	0.5	MMF-020-105 ---	1.0	20	6	0.5	MMS-015-226 ---	22	15	6	3.0
MMU-020-152 ---	.0015	20	6	0.5	MMF-015-155 ---	1.5	15	6	0.5	MMS-010-336 ---	33	10	6	3.0
MMU-020-222 ---	.0022	20	6	0.5	MMF-010-225 ---	2.2	10	6	0.5	MMS-006-476 ---	47	6	6	3.0
MMU-020-332 ---	.0033	20	6	0.5	MMF-006-335 ---	3.3	6	6	0.5	MMS-004-686 ---	68	4	8	3.0
MMU-020-472 ---	.0047	20	6	0.5	MMF-004-475 ---	4.7	4	8	0.5					
MMU-020-682 ---	.0068	20	6	0.5	MMF-003-685 ---	6.8	3	10	0.5	J Case Size				
MMU-020-103 ---	.010	20	6	0.5	MMF-002-106 ---	10	2	10	0.5	MMJ-035-106 ±.5%	10	35	6	9.0
MMU-020-153 ---	.015	20	6	0.5						MMJ-035-156 ---	15	35	6	9.0
MMU-020-223 ---	.022	20	6	0.5	M Case Size					MMJ-035-226 ---	22	35	6	9.0
MMU-020-333 ---	.033	20	6	0.5	MMM-035-684 ±.5%	.68	35	6	1.0	MMJ-025-336 ---	33	25	6	9.0
MMU-020-473 ---	.047	20	6	0.5	MMM-035-105 ---	1.0	35	6	1.0	MMJ-020-476 ---	47	20	8	9.0
MMU-020-683 ---	.068	20	6	0.5	MMM-035-155 ---	1.5	35	6	1.0	MMJ-015-686 ---	68	15	8	9.0
MMU-020-104 ---	.10	20	6	0.5	MMM-025-225 ---	2.2	25	6	1.0	MMJ-010-107 ---	100	10	8	9.0
MMU-020-154 ---	.15	20	6	0.5	MMM-020-335 ---	3.3	20	6	1.0	MMJ-006-157 ---	150	6	10	9.0
MMU-020-224 ---	.22	20	6	0.5	MMM-020-475 ---	4.7	20	6	1.0	MMJ-003-227 ---	220	3	15	9.0
MMU-015-334 ---	.33	15	6	0.5	MMM-010-685 ---	6.8	10	6	1.0					
MMU-010-474 ---	.47	10	6	0.5										
MMU-006-684 ---	.68	6	6	0.5										

*Add "A" — for Axial leads, "R" — for Radial leads

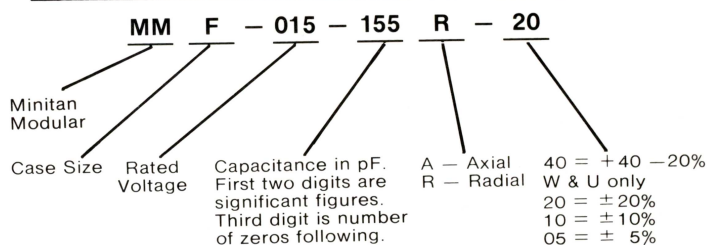
**Add tolerance symbol from Part Number Explanation.

PART MARKING

All case sizes are type marked, except MMW which is color coded.



PART NUMBER EXPLANATION



EIA COLOR DOT CODING

0 Black (omitted)	1 Brown	2 Red
3 Orange	4 Yellow	5 Green
6 Blue	7 Violet	8 Gray
9 White		

Solid Tantalum Capacitors

CORNING

MICROMINIATURE MINITAN[®] CORDWOOD MZ SERIES

FOR FILTERING • COUPLING • BY-PASSING • TIMING

CORNING* solid tantalum capacitors are manufactured by Components Incorporated, a wholly owned subsidiary of Corning Glass Works.

These precision, microminiature polar capacitors are suitable for general filtering, coupling, by-passing, and noncritical RC timing applications to +85°C without derating and to +125°C with derating to ⅓ WVDC. Very favorable capacitance to volume ratios make them especially well suited to high density applications such as found in avionics systems, subminiature communications equipment, and thick film circuitry.

PERFORMANCE CHARACTERISTICS

Capacitance — Measured at +25°C and 120Hz on a polarized capacitance bridge with a maximum polarizing voltage of 2.2 vdc and a maximum ac signal of 1.0 volts rms.

Tolerance — Except for the MZY and MZP case sizes, standard tolerance is $\pm 20\%$ with $\pm 10\%$ or $\pm 5\%$ tolerance available in all case sizes. ($\pm 5\%$ and 10% tolerance available for capacitance values of .01MFD or greater). 10% capacitance decade values are offered in $\pm 10\%$ or $\pm 5\%$ tolerance.

Dissipation Factor — Measured simultaneously with capacitance as above. See Part Number Section for maximum +25°C, 120Hz values.

DC Leakage Current — With rated WVDC applied through a 1000 ohm resistor for a maximum of 5 minutes, at 25°C. DCL values in μA will not exceed those shown in the part number section.

at 85°C — 10 times the value

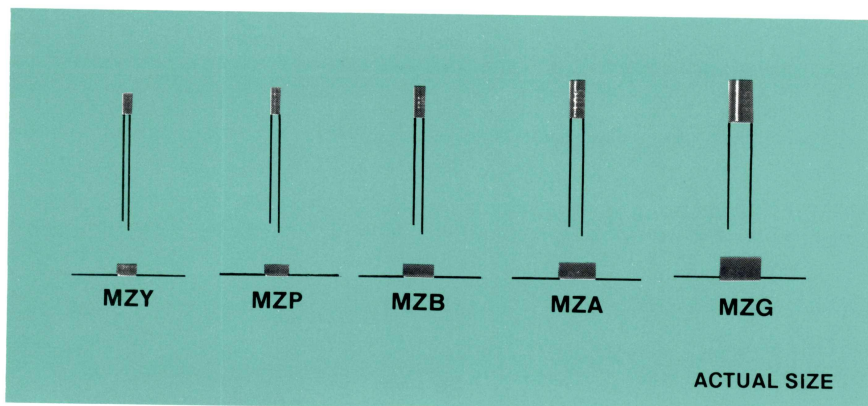
at 125°C — 15 times the value (at ⅓ rated voltage).

Operating Voltage — Capacitors will operate reliably up to rated WVDC at +85°C and to +125°C with linear derating to ⅓ WVDC. Capacitors will withstand peak voltages in the reverse direction equal to 15% of the dc rating at +25°C, 10% at +55°C, and 5% at +85°C. Ac ripple voltage should be limited so that the forward dc voltage plus peak ac voltage does not exceed rated WVDC.

Surge Voltage — At +85°C and at 60-second intervals, capacitors withstand 1000 30-second applications of 130% rated WVDC.

Temperature — No derating is required between -55°C and +85°C. Between +85°C and +125°C, derate linearly to ⅓ WVDC.

Moisture Resistance — Following Method 106, MIL-STD-202 testing, capacitors will meet initial dc leakage requirements. Capacitance will be within $\pm 10\%$ of initial values.



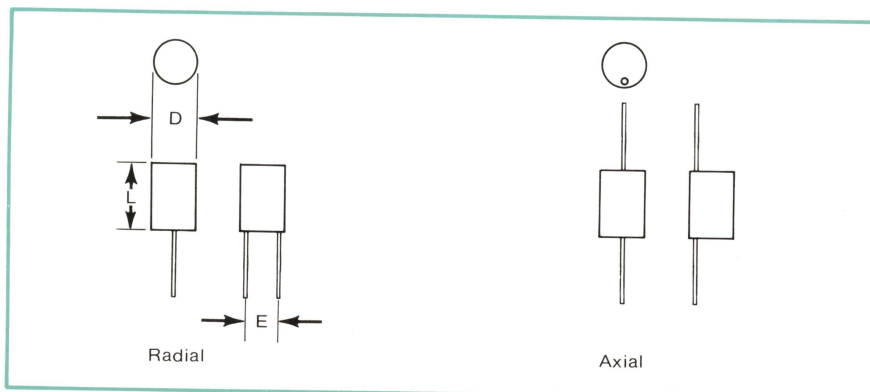
Life Test — After 2000 hours at +85°C with rated WVDC applied, capacitors will meet initial dc leakage and DF requirements. Capacitance will not change more than $\pm 10\%$ from original values.

MECHANICAL

Construction — Tantalum pellets are encased in polyester sleeves and sealed with a special moisture resistant epoxy resin. This rugged, fully insulated package with-

stands a one minute application of a 100 volt potential applied between the leads shorted together and an encircling metal foil envelope.

Leads — Leads are solder coated pure nickel wire suitable for soldering or welding. Tested in accordance with MIL-C-55365, .010 diameter leads withstand a 1 lb. pull and .016 diameter leads a 3 lb. pull. All lead diameters withstand 5 rotations twist.



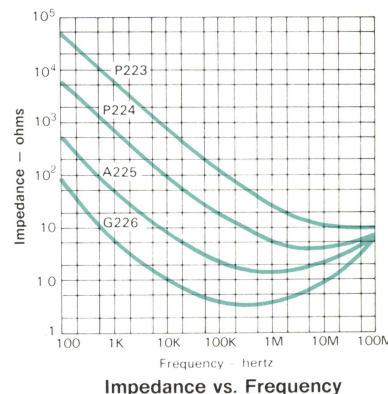
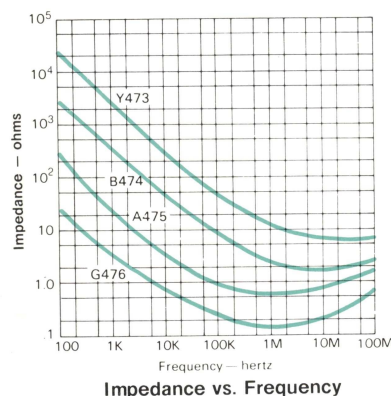
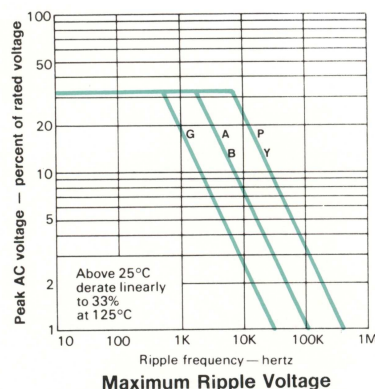
Dimensions — Inches (Millimeters)

Case Size	L Max.	D Max.	E
MZY	.125 (3.18)	.070 (1.78)	.050 (1.27) $\pm .015 (\pm .38)$
MZP	.160 (4.06)	.070 (1.78)	.050 (1.27) $\pm .015 (\pm .38)$
MZB	.200 (5.08)	.080 (2.03)	.050 (1.27) $\pm .015 (\pm .38)$
MZA	.225 (5.72)	.100 (2.54)	.070 (1.78) $\pm .020 (\pm .51)$
MZG	.250 (6.35)	.150 (3.81)	.120 (3.05) $\pm .025 (\pm .64)$

Leads: Y, P, B, A leads are 30 AWG, .010 $\pm .002$ (.25 $\pm .051$) Diameter
G leads are 26 AWG, .016 $\pm .002$ (.41 $\pm .051$) Diameter
All anode leads are 1.625 $\pm .125$ (41.3 ± 3.18) Long
All cathode leads are 1.375 $\pm .125$ (34.9 ± 3.18) Long

Solid Tantalum Capacitors

CORNING

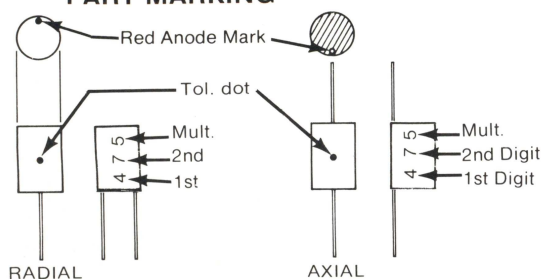


PART NUMBERS AND ORDERING INFORMATION

P/N	μ F Cap.	Max. WVDC	Max. % DF	Max. DCL	P/N	μ F Cap.	Max. WVDC	Max. % DF	Max. DCL	P/N	μ F Cap.	Max. WVDC	Max. % DF	Max. DCL															
Y Case Size					Std. Cap. Tol. +40% -20%					MZA Case Size					Std. Cap. Tol. $\pm$ 20%														
MZY-020-102 $\pm$ -. $\pm$ $\pm$	.0010	20	6	0.5	MZY-020-152 $\pm$ -. $\pm$ $\pm$	.0015	20	6	0.5	MZY-020-222 $\pm$ -. $\pm$ $\pm$	.0022	20	6	0.5	MZA-035-684 $\pm$ -. $\pm$ $\pm$	.68	35	6	1.0	MZA-035-105 $\pm$ -. $\pm$ $\pm$	1.0	35	6	1.0					
MZY-020-332 $\pm$ -. $\pm$ $\pm$	.0033	20	6	0.5	MZY-020-472 $\pm$ -. $\pm$ $\pm$	.0047	20	6	0.5	MZY-020-682 $\pm$ -. $\pm$ $\pm$	.0068	20	6	0.5	MZA-020-155 $\pm$ -. $\pm$ $\pm$	1.5	20	6	1.0	MZA-020-225 $\pm$ -. $\pm$ $\pm$	2.2	20	6	1.0					
MZY-020-103 $\pm$ -. $\pm$ $\pm$	.010	20	6	0.5	MZY-020-153 $\pm$ -. $\pm$ $\pm$	.015	20	6	0.5	MZY-020-223 $\pm$ -. $\pm$ $\pm$	.022	20	6	0.5	MZA-015-335 $\pm$ -. $\pm$ $\pm$	3.3	15	6	1.0	MZA-010-475 $\pm$ -. $\pm$ $\pm$	4.7	10	6	1.0					
MZY-020-153 $\pm$ -. $\pm$ $\pm$	.015	20	6	0.5	MZY-020-223 $\pm$ -. $\pm$ $\pm$	.022	20	6	0.5	MZY-020-333 $\pm$ -. $\pm$ $\pm$	.033	20	6	0.5	MZA-006-685 $\pm$ -. $\pm$ $\pm$	6.8	6	6	1.0	MZA-004-106 $\pm$ -. $\pm$ $\pm$	10.	4	8	1.0					
MZY-020-223 $\pm$ -. $\pm$ $\pm$	.022	20	6	0.5	MZY-020-333 $\pm$ -. $\pm$ $\pm$	.033	20	6	0.5	MZY-020-473 $\pm$ -. $\pm$ $\pm$	.047	20	6	0.5	MZA-003-156 $\pm$ -. $\pm$ $\pm$	15.	3	10	1.0	MZA-002-226 $\pm$ -. $\pm$ $\pm$	22.	2	10	1.0					
MZY-020-333 $\pm$ -. $\pm$ $\pm$	.033	20	6	0.5	MZY-020-473 $\pm$ -. $\pm$ $\pm$	.047	20	6	0.5	MZY-020-683 $\pm$ -. $\pm$ $\pm$	.068	20	6	0.5	MZG Case Size					Std. Cap. Tol. $\pm$ 20%									
MZY-020-473 $\pm$ -. $\pm$ $\pm$	.047	20	6	0.5	MZY-020-683 $\pm$ -. $\pm$ $\pm$	.068	20	6	0.5	MZY-020-104 $\pm$ -. $\pm$ $\pm$	.10	20	6	0.5	MZG-035-155 $\pm$ -. $\pm$ $\pm$	1.5	35	6	1.5	MZG-035-225 $\pm$ -. $\pm$ $\pm$	2.2	35	6	1.5					
MZY-020-683 $\pm$ -. $\pm$ $\pm$	.068	20	6	0.5	MZY-020-104 $\pm$ -. $\pm$ $\pm$	.10	20	6	0.5	MZY-020-154 $\pm$ -. $\pm$ $\pm$	.15	20	6	0.5	MZG-020-335 $\pm$ -. $\pm$ $\pm$	3.3	20	6	1.5	MZG-020-475 $\pm$ -. $\pm$ $\pm$	4.7	20	6	1.5					
MZY-020-104 $\pm$ -. $\pm$ $\pm$	.10	20	6	0.5	MZY-020-154 $\pm$ -. $\pm$ $\pm$	.15	20	6	0.5	MZY-020-224 $\pm$ -. $\pm$ $\pm$	.22	20	6	0.5	MZG-015-106 $\pm$ -. $\pm$ $\pm$	10.	15	6	1.5	MZG-010-156 $\pm$ -. $\pm$ $\pm$	15.	10	6	1.5					
MZY-020-154 $\pm$ -. $\pm$ $\pm$	.15	20	6	0.5	MZY-020-224 $\pm$ -. $\pm$ $\pm$	.22	20	6	0.5	MZY-015-334 $\pm$ -. $\pm$ $\pm$	.33	15	6	0.5	MZG-006-226 $\pm$ -. $\pm$ $\pm$	22.	6	6	1.5	MZG-004-336 $\pm$ -. $\pm$ $\pm$	33.	4	8	1.5					
MZY-020-224 $\pm$ -. $\pm$ $\pm$	.22	20	6	0.5	MZY-015-334 $\pm$ -. $\pm$ $\pm$	.33	15	6	0.5	MZY-010-474 $\pm$ -. $\pm$ $\pm$	.47	10	6	0.5	MZG-003-476 $\pm$ -. $\pm$ $\pm$	47.	3	10	1.5										
MZY-015-334 $\pm$ -. $\pm$ $\pm$	.33	15	6	0.5	MZY-010-474 $\pm$ -. $\pm$ $\pm$	.47	10	6	0.5	MZY-006-684 $\pm$ -. $\pm$ $\pm$	.68	6	6	0.5															
MZY-010-474 $\pm$ -. $\pm$ $\pm$	.47	10	6	0.5	MZY-006-684 $\pm$ -. $\pm$ $\pm$	.68	6	6	0.5	MZY-004-105 $\pm$ -. $\pm$ $\pm$	1.0	4	8	0.5															
MZY-006-684 $\pm$ -. $\pm$ $\pm$	.68	6	6	0.5	MZY-004-105 $\pm$ -. $\pm$ $\pm$	1.0	4	8	0.5	MZY-003-155 $\pm$ -. $\pm$ $\pm$	1.5	3	10	0.5															
MZY-004-105 $\pm$ -. $\pm$ $\pm$	1.0	4	8	0.5	MZY-003-155 $\pm$ -. $\pm$ $\pm$	1.5	3	10	0.5	MZY-002-225 $\pm$ -. $\pm$ $\pm$	2.2	2	10	0.5															
MZY-003-155 $\pm$ -. $\pm$ $\pm$	1.5	3	10	0.5						MZB Case Size					Std. Cap. Tol. $\pm$ 20%														
MZY-002-225 $\pm$ -. $\pm$ $\pm$	2.2	2	10	0.5						MZB-035-334 $\pm$ -. $\pm$ $\pm$	.33	35	6	0.5	MZB-035-474 $\pm$ -. $\pm$ $\pm$	.47	35	6	0.5	MZB-020-684 $\pm$ -. $\pm$ $\pm$	.68	20	6	0.5	MZB-020-105 $\pm$ -. $\pm$ $\pm$	1.0	20	6	0.5
										MZB-035-474 $\pm$ -. $\pm$ $\pm$	.47	35	6	0.5	MZB-020-155 $\pm$ -. $\pm$ $\pm$	1.5	15	6	0.5	MZB-010-225 $\pm$ -. $\pm$ $\pm$	2.2	10	6	0.5					
										MZB-020-684 $\pm$ -. $\pm$ $\pm$	.68	20	6	0.5															
										MZB-020-105 $\pm$ -. $\pm$ $\pm$	1.0	20	6	0.5															
										MZB-015-155 $\pm$ -. $\pm$ $\pm$	1.5	15	6	0.5															
										MZB-010-225 $\pm$ -. $\pm$ $\pm$	2.2	10	6	0.5															

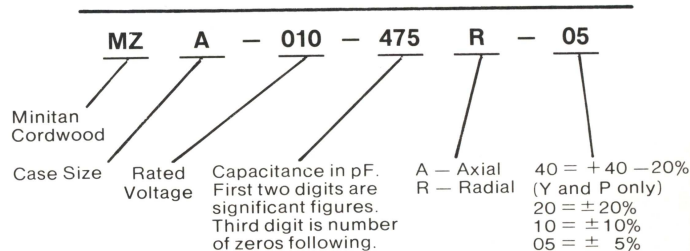
*Add — "A" for Axial, "R" for Radial. **Add Tolerance Symbol from Part Number Table.

PART MARKING



Tol. Dot
Gold = $\pm 5\%$
Silver = $\pm 10\%$
None = $\pm 20\%$
and +40 -20%

PART NUMBER EXPLANATION



Solid Tantalum Capacitors

CORNING

MICROMINIATURE MINITAN[®] NONPOLAR MN SERIES

FOR FILTERING • COUPLING • BY-PASSING • TIMING

CORNING[®] solid tantalum capacitors are manufactured by Components Incorporated, a wholly owned subsidiary of Corning Glass Works.

These precision, microminiature nonpolar capacitors are intended specifically for high density packaging applications where occasional or continuous voltage reversals occur. No dc bias is required. Weldable/solderable leads and a wide range of shapes, case sizes, and lead configurations facilitate application to a broad range of miniaturized electronic circuitry.

PERFORMANCE CHARACTERISTICS

Capacitance — Measured at +25°C and 120Hz on a polarized capacitance bridge with a maximum polarizing voltage of 2.2 vdc and a maximum ac signal of 1.0 volts rms.

Tolerance — Standard tolerance is $\pm 20\%$ with $\pm 10\%$ or $\pm 5\%$ tolerance available in all case sizes ($\pm 5\%$ and $\pm 10\%$ available for capacitance values of .01 MFD or greater.) 10% decade values are offered in $\pm 10\%$ or $\pm 5\%$ tolerance.

Dissipation Factor — Measured simultaneously with capacitance as above. See Part Number Table for maximum +25°C, 120 Hz values.

DC Leakage Current — With rated WVDC applied through a 1000 ohm resistor for a maximum of 5 minutes, at 25°C. DCL values in μA will not exceed those shown in the part number section.

at 85°C — 10 times the value
at 125°C — 15 times the value at ($\frac{1}{2}$ rated voltage).

Operating Voltage — Capacitors will operate at +85°C and to +125°C with linear derating to $\frac{1}{2}$ rated voltage. Dc biasing is not necessary. Peak ac voltage plus dc voltage should not exceed rated voltage.

Surge Voltage — At +85°C and at 60-second intervals, capacitors withstand 1000 30-second applications of 130% rated WVDC.

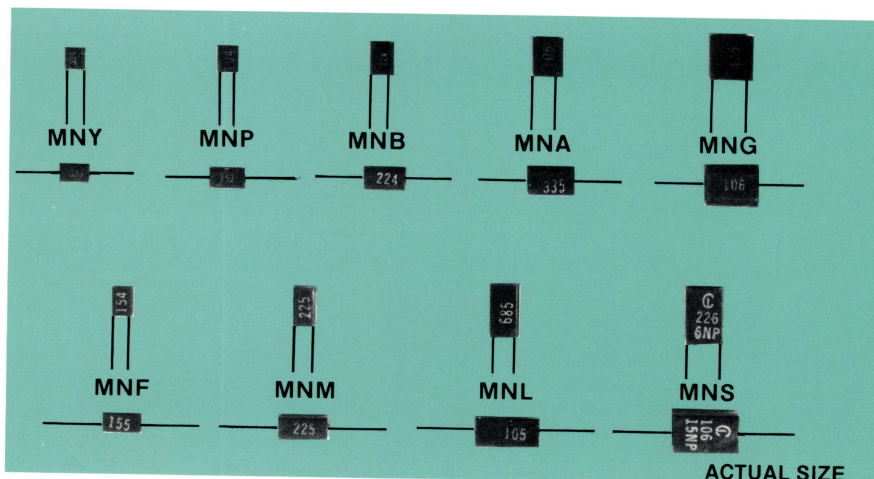
Temperature — No derating is required between -55°C and +85°C. Between +85°C and +125°C, derate linearly to $\frac{1}{2}$ WVDC.

Moisture Resistance — Following Method 106, MIL-STD-202 testing, capacitors will meet initial dc leakage requirements. Capacitance will be within $\pm 10\%$ of initial values.

Life Test — After 2000 hours at +85°C with rated WVDC applied, capacitors will meet initial dc leakage and DF requirements. Capacitance will not change more than $\pm 10\%$ from original values.

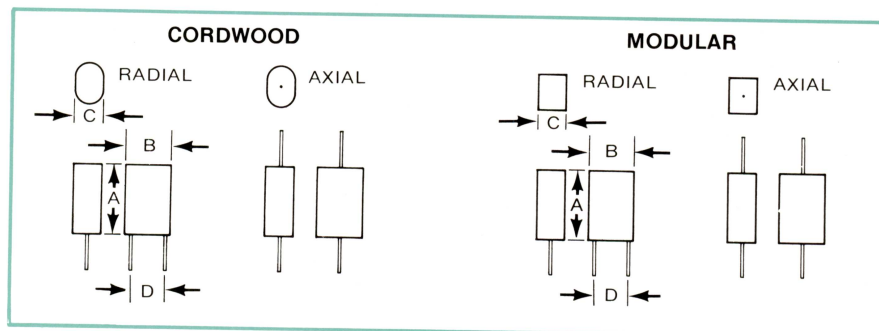
MECHANICAL

Construction — Tantalum pellets are encased in polyester sleeves and sealed with



a special moisture resistant epoxy resin. This rugged, fully insulated package withstands a one minute application of a 100 volt potential applied between the leads shorted together and an encircling metal foil envelope.

Leads — Leads are solder coated pure nickel wire suitable for soldering or welding. Tested in accordance with MIL-C-55365, .010 diameter leads withstand a 1 lb. pull and .016 diameter leads a 3 lb. pull. All lead diameters withstand 5 rotations twist.



Dimensions — Inches (Millimeters)

Case Size	A Max. (Axial)	A Max. (Radial)	B Max.	C Max.	D
MNY	.175 (4.45)	.135 (3.43)	.120 (3.05)	.070 (1.78)	.100 (2.54) $\pm .020 (\pm .51)$
MNP	.210 (5.33)	.160 (4.06)	.120 (3.05)	.070 (1.78)	.100 (2.54) $\pm .020 (\pm .51)$
MNB	.240 (6.10)	.200 (5.08)	.140 (3.56)	.080 (2.03)	.100 (2.54) $\pm .020 (\pm .51)$
MNA	.275 (6.99)	.235 (5.97)	.190 (4.83)	.105 (2.67)	.125 (3.18) $\pm .020 (\pm .51)$
MNG	.310 (7.87)	.270 (6.86)	.290 (7.37)	.155 (3.94)	.200 (5.08) $\pm .025 (\pm .64)$
MNF	.220 (5.59)	.180 (4.57)	.125 (3.18)	.125 (3.18)	.100 (2.54) $\pm .020 (\pm .51)$
MNM	.280 (7.11)	.240 (6.10)	.140 (3.56)	.180 (4.57)	.100 (2.54) $\pm .020 (\pm .51)$
MNL	.370 (9.40)	.315 (8.00)	.180 (4.57)	.220 (5.59)	.150 (3.81) $\pm .025 (\pm .64)$
MNS	.390 (9.91)	.335 (8.51)	.230 (5.84)	.230 (5.84)	.200 (5.08) $\pm .025 (\pm .64)$

Leads: NG, NL and NS leads are 26 AWG, .016 $\pm .002$ (.41 $\pm .051$) diameter
All others are 30 AWG, .010 $\pm .002$ (.25 $\pm .051$) diameter
All leads are 1.625 $\pm .125$ (.413 $\pm .318$) long
Cap and WVDC are printed on NS case

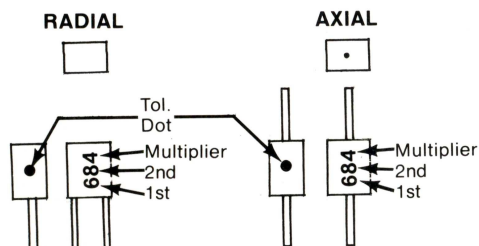
PART NUMBERS AND ORDERING INFORMATION

P/N	μ F Cap.	Max. WVDC	Max. % DF	Max. DCL	P/N	μ F Cap.	Max. WVDC	Max. % DF	Max. DCL	P/N	μ F Cap.	Max. WVDC	Max. % DF	Max. DCL
MNY Case Size Std. Cap. Tol. $\pm 20\%$					MNB Case Size Std. Cap. Tol. $\pm 20\%$					MNF Case Size Std. Cap. Tol. $\pm 20\%$				
MNY-020-102 $\pm$ - **	.0010	20	6	0.5	MNB-035-154 $\pm$ - **	.15	35	6	0.5	MNF-020-474 $\pm$ - **	.47	20	6	0.5
MNY-020-152 - - - -	.0015	20	6	0.5	MNB-035-224 - - - -	.22	35	6	0.5	MNF-015-684 - - - -	.68	15	6	0.5
MNY-020-222 - - - -	.0022	20	6	0.5	MNB-020-334 - - - -	.33	20	6	0.5	MNF-010-105 - - - -	1.0	10	6	0.5
MNY-020-332 - - - -	.0033	20	6	0.5	MNB-020-474 - - - -	.47	20	6	0.5	MNF-006-155 - - - -	1.5	6	6	0.5
MNY-020-472 - - - -	.0047	20	6	0.5	MNB-015-684 - - - -	.68	15	6	0.5	MNF-004-225 - - - -	2.2	4	8	0.5
MNY-020-682 - - - -	.0068	20	6	0.5	MNB-010-105 - - - -	1.0	10	6	0.5	MNF-003-335 - - - -	3.3	3	10	0.5
MNY-020-103 - - - -	.010	20	6	0.5	MNB-006-155 - - - -	1.5	6	6	0.5	MNF-002-475 - - - -	4.7	2	10	0.5
MNY-020-153 - - - -	.015	20	6	0.5	MNB-004-225 - - - -	2.2	4	8	0.5	MNM Case Size Std. Cap. Tol. $\pm 20\%$				
MNY-020-223 - - - -	.022	20	6	0.5	MNB-003-335 - - - -	3.3	3	10	0.5	MNM-035-334 $\pm$ - **	.33	35	6	1.0
MNY-020-333 - - - -	.033	20	6	0.5	MNB-002-475 - - - -	4.7	2	10	0.5	MNM-035-474 - - - -	.47	35	6	1.0
MNY-020-473 - - - -	.047	20	6	0.5	MNA Case Size Std. Cap. Tol. $\pm 20\%$					MNM-035-684 - - - -	.68	35	6	1.0
MNY-020-683 - - - -	.068	20	6	0.5	MNA-035-334 $\pm$ - **	.33	35	6	1.0	MNM-025-105 - - - -	1.0	25	6	1.0
MNY-020-104 - - - -	.10	20	6	0.5	MNA-035-474 - - - -	.47	35	6	1.0	MNM-020-155 - - - -	1.5	20	6	1.0
MNY-015-154 - - - -	.15	15	6	0.5	MNA-020-684 - - - -	.68	20	6	1.0	MNM-020-225 - - - -	2.2	20	6	1.0
MNY-010-224 - - - -	.22	10	6	0.5	MNA-020-105 - - - -	1.0	20	6	1.0	MNM-010-335 - - - -	3.3	10	6	1.0
MNY-006-334 - - - -	.33	6	6	0.5	MNA-015-155 - - - -	1.5	15	6	1.0	MNM-006-475 - - - -	4.7	6	6	1.0
MNY-004-474 - - - -	.47	4	8	0.5	MNA-010-225 - - - -	2.2	10	6	1.0	MNM-004-685 - - - -	6.8	4	8	1.0
MNY-003-684 - - - -	.68	3	10	0.5	MNA-006-335 - - - -	3.3	6	6	1.0	MNM-003-106 - - - -	10.	3	10	1.0
MNY-002-105 - - - -	1.0	2	10	0.5	MNA-004-475 - - - -	4.7	4	8	1.0	MNL Case Size Std. Cap. Tol. $\pm 20\%$				
MNP Case Size Std. Cap. Tol. $\pm 20\%$					MNA-003-685 - - - -	6.8	3	10	1.0	MNL-035-105 $\pm$ - **	1.0	35	6	2.0
MNP-050-102 $\pm$ - **	.0010	50	6	0.5	MNA-002-106 - - - -	10.	2	10	1.0	MNL-035-155 - - - -	1.5	35	6	2.0
MNP-050-152 - - - -	.0015	50	6	0.5	MNG Case Size Std. Cap. Tol. $\pm 20\%$					MNL-035-225 - - - -	2.2	35	6	2.0
MNP-050-222 - - - -	.0022	50	6	0.5	MNG-035-684 $\pm$ - **	.68	35	6	1.5	MNL-025-335 - - - -	3.3	25	6	2.0
MNP-050-332 - - - -	.0033	50	6	0.5	MNG-035-105 - - - -	1.0	35	6	1.5	MNL-020-475 - - - -	4.7	20	6	2.0
MNP-050-472 - - - -	.0047	50	6	0.5	MNG-020-155 - - - -	1.5	20	6	1.5	MNL-015-685 - - - -	6.8	15	6	2.0
MNP-035-682 - - - -	.0068	35	6	0.5	MNG-020-225 - - - -	2.2	20	6	1.5	MNL-010-106 - - - -	10.	10	6	2.0
MNP-035-103 - - - -	.010	35	6	0.5	MNG-020-335 - - - -	3.3	20	6	1.5	MNL-006-156 - - - -	15.	6	6	2.0
MNP-035-153 - - - -	.015	35	6	0.5	MNG-015-475 - - - -	4.7	15	6	1.5	MNL-004-226 - - - -	22.	4	8	2.0
MNP-035-223 - - - -	.022	35	6	0.5	MNG-010-685 - - - -	6.8	10	6	1.5	MNS Case Size Std. Cap. Tol. $\pm 20\%$				
MNP-035-333 - - - -	.033	35	6	0.5	MNG-006-106 - - - -	10.	6	6	1.5	MNS-035-335 $\pm$ - **	3.3	35	6	3.0
MNP-035-473 - - - -	.047	35	6	0.5	MNG-004-156 - - - -	15.	4	8	1.5	MNS-025-475 - - - -	4.7	25	6	3.0
MNP-035-683 - - - -	.068	35	6	0.5	MNG-003-226 - - - -	22.	3	10	1.5	MNS-020-685 - - - -	6.8	20	6	3.0
MNP-035-104 - - - -	.10	35	6	0.5	MNF Case Size Std. Cap. Tol. $\pm 20\%$					MNS-015-106 - - - -	10.	15	6	3.0
MNP-020-154 - - - -	.15	20	6	0.5	MNF-035-104 $\pm$ - **	.10	35	6	0.5	MNS-010-156 - - - -	15.	10	6	3.0
MNP-020-224 - - - -	.22	20	6	0.5	MNF-035-154 - - - -	.15	35	6	0.5	MNS-006-226 - - - -	22.	6	6	3.0
MNP-015-334 - - - -	.33	15	6	0.5	MNF-035-224 - - - -	.22	35	6	0.5	MNS-004-336 - - - -	33.	4	8	3.0
MNP-010-474 - - - -	.47	10	6	0.5	MNF-025-334 - - - -	.33	25	6	0.5					
MNP-006-684 - - - -	.68	6	6	0.5										
MNP-004-105 - - - -	1.0	4	8	0.5										
MNP-003-155 - - - -	1.5	3	10	0.5										
MNP-002-225 - - - -	2.2	2	10	0.5										

*Add "A" — for Axial leads, "R" — for Radial leads

**Add tolerance symbol from Part Number Explanation.

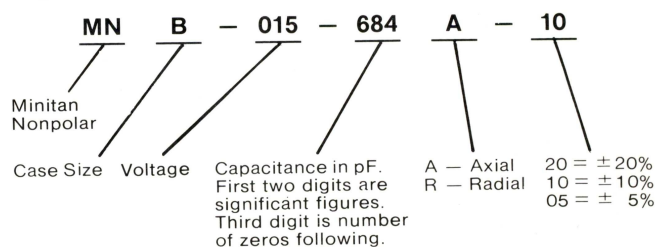
PART MARKING



Notes: 1. White typographical markings on black body.
2. For NS case size, CAP, WVNP and C.I. logo are printed.

Tol. Dot
Gold = $\pm 5\%$
Silver = $\pm 10\%$
None = $\pm 20\%$

PART NUMBER EXPLANATION



Solid Tantalum Capacitors

CORNING

SUBMINIATURE MINIDIP™ MD SERIES

For Filtering • Coupling
• By-Passing • Timing

CORNING® solid tantalum capacitors are manufactured by Components Incorporated, a wholly owned subsidiary of Corning Glass Works.

These subminiature, polar tantalum capacitors are suitable for general filtering, coupling, by-passing and non-critical RC timing applications to +85°C without voltage derating. Intended specifically for commercial and industrial applications, Minidip Series capacitors feature subminiature size and superior performance at a reasonable cost.

PERFORMANCE CHARACTERISTICS

Capacitance — Measured at +25°C and 120 Hz on a polarized capacitance bridge with a maximum polarizing voltage of 2.2 VDC and a maximum AC signal of 1.0 volts RMS.

Tolerance — Standard tolerance is $\pm 20\%$. $\pm 10\%$ tolerance is available.

Dissipation Factor — Measured simultaneously with capacitance as above.

Operating Voltage — Capacitors will operate reliably up to rated WVDC at +85°C without derating. AC ripple voltage should be limited so that the forward DC voltage plus peak AC voltage does not exceed rated WVDC.

Temperature Range — -55°C to +85°C without voltage derating.

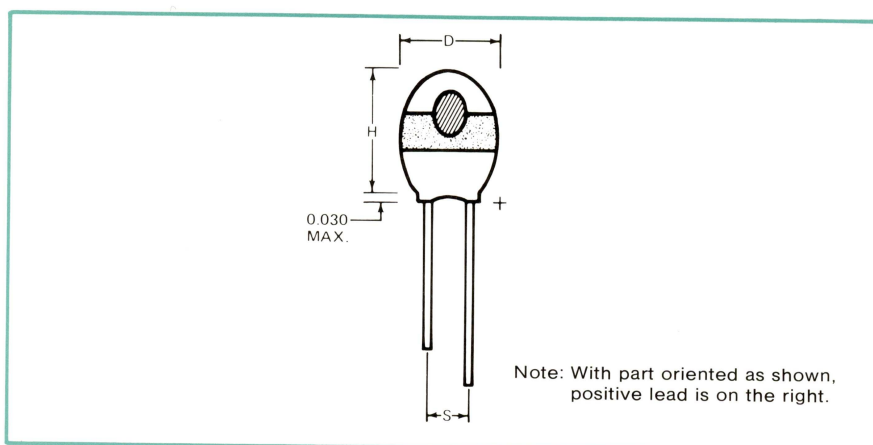
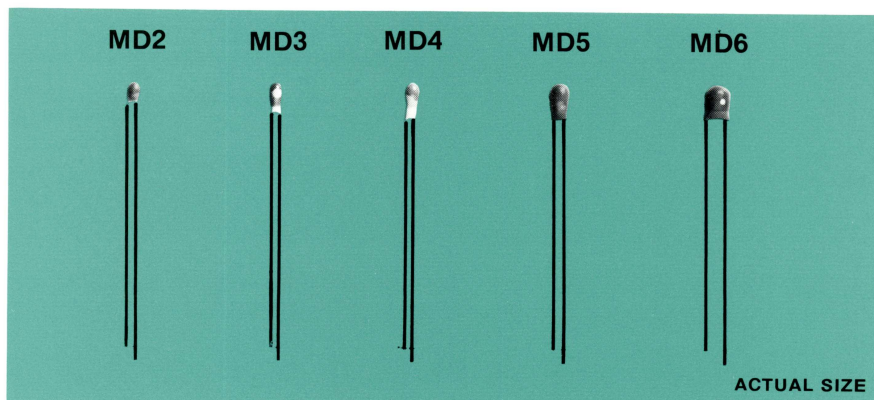
Surge Voltage — At +85°C and at 60-second intervals, capacitors withstand 1000 30-second applications of 130% rated WVDC.

Life Test — After 2000 hours at +85°C with rated WVDC applied, capacitors will not exceed 150% of the initial DC leakage and D.F. limits. Capacitance will not change more than $\pm 10\%$ from the initial value.

MECHANICAL

Construction — Minidip Series capacitors feature subminiature tantalum anodes, sealed in high stability, moisture-resistant epoxy.

Leads — Leads are solder coated, high purity nickel wire suitable for either soldering or welding. Tested in accordance with MIL-C-55365, termination will withstand a one pound pull.

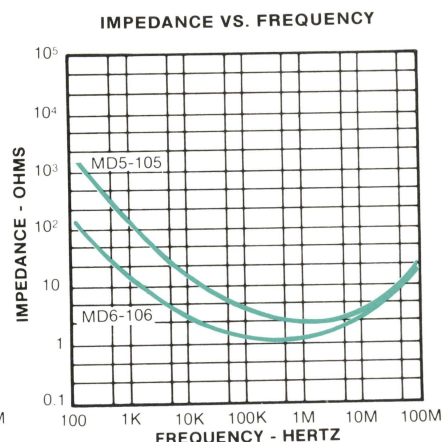
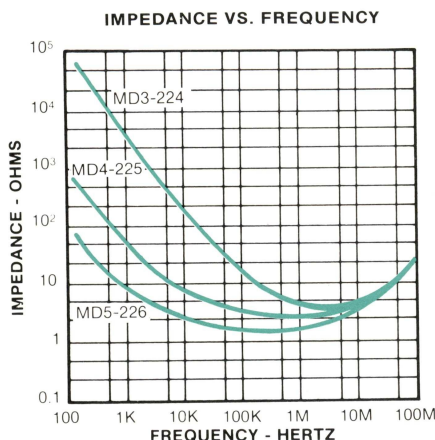
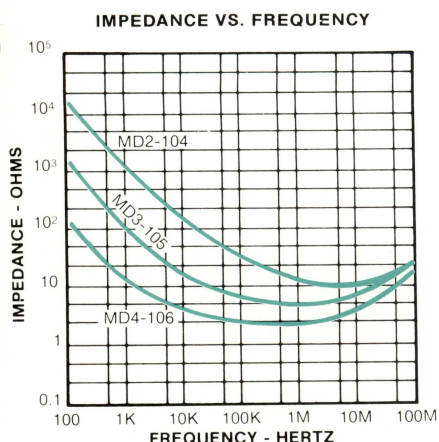


Dimensions — Inches (Millimeters)

Case Size	H Max.	D Max.	S	Lead Length ± 0.125 (± 3.18)		Lead Diameter ± 0.002 (± 0.051)
				Anode	Cathode	
MD2	0.175	0.095	0.050 ± 0.015 (1.27)	1.625	1.375	30 AWG 0.010
	(4.44)	(2.41)	(± 0.38)	(41.3)	(34.9)	(0.250)
MD3	0.210	0.110	0.050 ± 0.015 (1.27)	1.625	1.375	30 AWG 0.010
	(5.33)	(2.79)	(± 0.38)	(41.3)	(34.9)	(0.250)
MD4	0.260	0.125	0.050 ± 0.015 (1.27)	1.625	1.375	30 AWG 0.010
	(6.60)	(3.18)	(± 0.38)	(41.3)	(34.9)	(0.250)
MD5	0.260	0.150	0.100 ± 0.025 (2.54)	1.625	1.375	30 AWG 0.010
	(6.60)	(3.81)	(± 0.64)	(41.3)	(34.9)	(0.250)
MD6	0.280	0.175	.125 ± 0.025 (3.18)	1.625	1.375	26 AWG 0.016
	(7.11)	(4.44)	(± 0.64)	(41.3)	(34.9)	(0.406)

Solid Tantalum Capacitors

CORNING

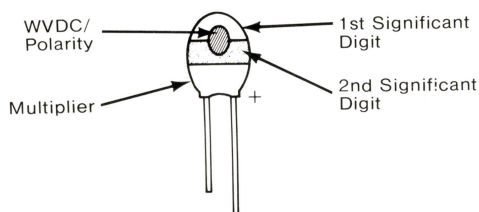


PART NUMBERS AND ORDERING INFORMATION

Value (Mfd)	Part Number	Case Size	Max D.F. (%)	Max DCL (μa)
2 Volts				
2.2	MD2-002-225-20	MD2	10	1.0
4.7	MD3-002-475-20	MD3	10	1.0
10.0	MD4-002-106-20	MD4	10	1.0
22.0	MD5-002-226-20	MD5	10	1.0
68.0	MD6-002-686-20	MD6	15	1.5
3 Volts				
1.5	MD2-003-155-20	MD2	10	1.0
3.3	MD3-003-335-20	MD3	10	1.0
6.8	MD4-003-685-20	MD4	10	1.0
15.0	MD5-003-156-20	MD5	10	1.0
47.0	MD6-003-476-20	MD6	10	1.5
4 Volts				
1.0	MD2-004-105-20	MD2	8	1.0
2.2	MD3-004-225-20	MD3	8	1.0
4.7	MD4-004-475-20	MD4	8	1.0
10.0	MD5-004-106-20	MD5	10	1.0
33.0	MD6-004-336-20	MD6	10	1.5
6 Volts				
.68	MD2-006-684-20	MD2	8	1.0
1.5	MD3-006-155-20	MD3	8	1.0
3.3	MD4-006-335-20	MD4	8	1.0
6.8	MD5-006-685-20	MD5	8	1.0
22.0	MD6-006-226-20	MD6	8	1.5
10 Volts				
.47	MD2-010-474-20	MD2	8	1.0
1.0	MD3-010-105-20	MD3	8	1.0
2.2	MD4-010-225-20	MD4	8	1.0
4.7	MD5-010-475-20	MD5	8	1.0
15.0	MD6-010-156-20	MD6	8	1.5
15 Volts				
.33	MD2-015-334-20	MD2	8	1.0
.68	MD3-015-684-20	MD3	8	1.0
1.5	MD4-015-155-20	MD4	8	1.0
3.3	MD5-015-335-20	MD5	8	1.0
10.0	MD6-015-106-20	MD6	8	1.5
20 Volts				
.15	MD2-020-154-20	MD2	8	1.0
.22	MD2-020-224-20	MD2	8	1.0
.33	MD3-020-334-20	MD3	8	1.0
.47	MD3-020-474-20	MD3	8	1.0
.68	MD4-020-684-20	MD4	8	1.0
1.0	MD4-020-105-20	MD4	8	1.0
1.5	MD5-020-155-20	MD5	8	1.0
2.2	MD5-020-225-20	MD5	8	1.0
6.8	MD6-020-685-20	MD6	8	1.5
35 Volts				
.10	MD2-035-104-20	MD2	8	1.0
.15	MD3-035-154-20	MD3	8	1.0
.22	MD3-035-224-20	MD3	8	1.0
.33	MD4-035-334-20	MD4	8	1.0
.47	MD4-035-474-20	MD4	8	1.0
.68	MD5-035-684-20	MD5	8	1.0
1.0	MD5-035-105-20	MD5	8	1.0
1.5	MD5-035-155-20	MD5	8	1.0
2.2	MD6-035-225-20	MD6	8	1.0
3.3	MD6-035-335-20	MD6	8	1.0
4.7	MD6-035-475-20	MD6	8	1.5

MARKING — Capacitance value in pF is shown by means of standard EIA color code rings. Polarity and rated voltage is indicated by a colored dot.

PART MARKING



Note: With part oriented as shown, positive lead is on the right.

Capacitance Code			WVDC/Polarity Dot	
Color	Significant Figures	Multiplier	Color	WVDC
Black	0		Brown	2v
Brown	1		White	3v
Red	2		Purple	4v
Orange	3	1,000	Yellow	6v
Yellow	4	10,000	Black	10v
Green	5	100,000	Green	15v
Blue	6	1,000,000	Blue	20v
Violet	7		Pink	35v
Gray	8			
White	9			

PART NUMBER EXPLANATION

MD	2	035	104	20
Minidip Series Designator	Case Size	Rated Voltage	Capacitance in pF. First two digits are significant figures. Third digit is the number of zeros following.	Tolerance 20 = ±20% 10 = ±10%

Solid Tantalum Capacitors

CORNING

MICROMINIATURE TANTALUM CHIPS MINICHIP MK SERIES

APPLICATIONS

Designed specifically for hybrid and P.C. board applications utilizing reflow solder, conductive epoxy or T.C. bonding techniques; these miniature solid tantalum chip capacitors provide the circuit designer with an encapsulated chip device with high volumetric efficiency and performance at an economical price.

PERFORMANCE CHARACTERISTICS

Capacitance — Measured on a polarized capacitance bridge with a maximum polarizing voltage of 2.2 vdc and a maximum ac signal 1.0 volts rms. See Part Number Table for available ratings.

Tolerance — Standard tolerance is $\pm 20\%$. Tolerances of $\pm 10\%$ and $\pm 5\%$ are available in all case sizes.

Dissipation Factor — Measured simultaneously with capacitance as above. See Part Number Table for maximum $+25^\circ\text{C}$ values.

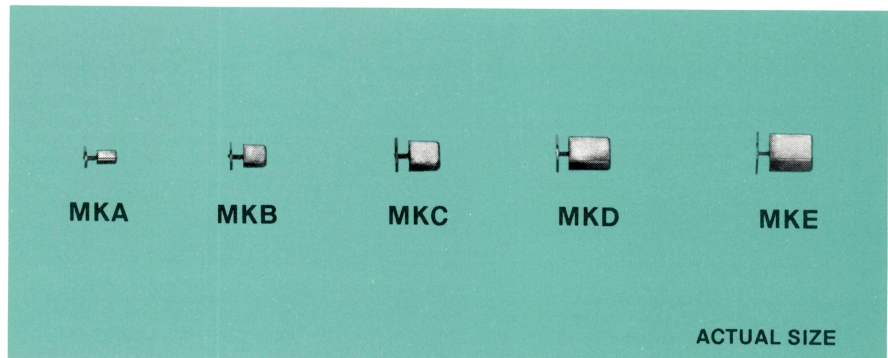
DC Leakage Current — With rated dc voltage applied through a 1000 ohm resistor in series with the capacitor, DCL will not exceed the values shown in Part Number Table. At $+85^\circ\text{C}$, DCL values will not exceed 10 times Part Number Table values. At $+125^\circ\text{C}$ with $\frac{2}{3}$ rated WVDC applied, DCL values will not exceed 15 times Part Number Table values.

Operating Voltage — Capacitors will operate reliably up to rated WVDC at $+85^\circ\text{C}$ and $+125^\circ\text{C}$ with linear derating to $\frac{2}{3}$ WVDC. AC ripple voltage should be limited so that the forward DC voltage plus peak AC voltage does not exceed rated WVDC.

Surge Voltage — At $+85^\circ\text{C}$ and at 60-second intervals, capacitors withstand 1000 30-second applications of 130% rated WVDC.

Capacitance Change with Temperature — The allowable change in capacitance value ($+25^\circ\text{C}$ Ref) as a function of temperature shall be as follows:

$$\begin{aligned} -55^\circ\text{C} &= -10\% \\ +85^\circ\text{C} &= +10\% \\ +125^\circ\text{C} &= +15\% \end{aligned}$$



Moisture Resistance — When tested in accordance with MIL-C-55365 the capacitor will meet the following requirements:

DC Leakage — Original requirements.

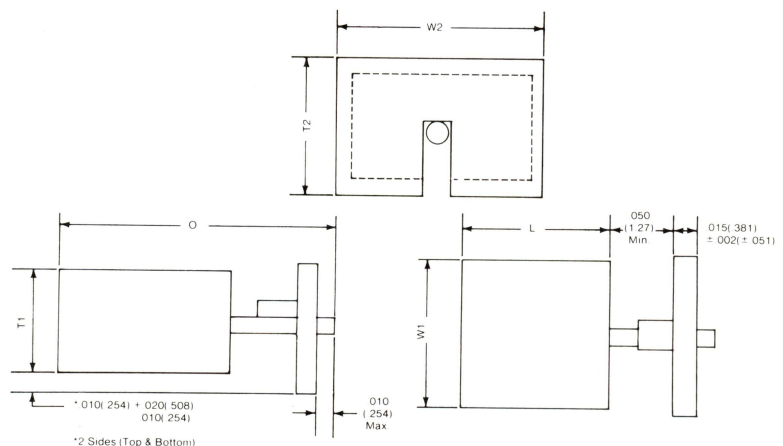
Capacitance — Shall not change more than $\pm 10\%$ from the initial measured value.

Dissipation Factor — Shall not exceed 150% of the initial requirements.

Life Test — After 2000 hours at $+85^\circ\text{C}$ with rated WVDC applied, capacitors will meet initial dc leakage and DF requirements. Capacitance will not change more than $\pm 10\%$ from initial values.

MECHANICAL

The MK chip capacitor features a tantalum slug which is encapsulated in a metal can, end-filled with a moisture-resistant epoxy. This rugged construction together with a unique positive termination makes the MK chip ideally suited for automatic insertion utilizing simple vibratory feed equipment.



DIMENSIONS — INCHES (Millimeters)

Case Size	O Max.	W1	W2	L	T1	T2
MKA	.210(5.33)	.065(1.65)	.090(2.28)	.110(2.80)	.065(1.65)	.090(2.28)
MKB	.225(5.72)	.115(2.92)	.125(3.17)	.135(3.43)	.060(1.52)	.090(2.28)
MKC	.265(6.73)	.155(3.94)	.165(4.19)	.175(4.44)	.075(1.90)	.095(2.41)
MKD	.330(8.38)	.165(4.19)	.175(4.44)	.235(5.97)	.105(2.67)	.125(3.17)
MKE	.340(8.64)	.170(4.32)	.180(4.57)	.245(6.22)	.145(3.68)	.165(4.19)

NOTE: Unless otherwise specified dimensions have $\pm .005$ ($\pm .13$) tolerance.

PART NUMBERS AND ORDERING INFORMATION

Part Number	Cap in μ fd at +25°C 120 Hz	WVDC at +85°C	Max D.F. % at +25°C 120 Hz	Max D.C.L. in μ A at +25°C	Part Number	Cap in μ fd at +25°C 120 Hz	WVDC at +85°C	Max D.F. % at +25°C 120 Hz	Max D.C.L. in μ A at +25°C
MKA Case Size					MKC Case Size (Cont.)				
MKA-050-104-*	.10	50	4.0	0.5	MKC-015-106-	10.0	15	6.0	2.0
MKA-050-154-	.15	50	4.0	0.5	MKC-010-156-	15.0	10	6.0	2.0
MKA-050-224-	.22	50	4.0	0.5					
MKA-035-334-	.33	35	4.0	0.5					
MKA-025-474-	.47	25	4.0	0.5					
MKA-025-684-	.68	25	4.0	0.5					
MKA-020-105-	1.0	20	4.0	0.5					
MKA-015-155-	1.5	15	6.0	0.5					
MKA-010-225-	2.2	10	6.0	0.5					
MKB Case Size					MKD Case Size				
MKB-050-334-*	.33	50	4.0	1.0	MKD-050-225-*	2.2	50	6.0	3.0
MKB-050-474-	.47	50	4.0	1.0	MKD-050-335-	3.3	50	6.0	3.0
MKB-035-684-	.68	35	4.0	1.0	MKD-035-475-	4.7	35	6.0	3.0
MKB-025-105-	1.0	25	4.0	1.0	MKD-025-685-	6.8	25	6.0	3.0
MKB-025-155-	1.5	25	6.0	1.0	MKD-020-106-	10.0	20	6.0	3.0
MKB-020-225-	2.2	20	6.0	1.0	MKD-015-156-	15.0	15	6.0	3.0
MKB-015-335-	3.3	15	6.0	1.0	MKD-010-226-	22.0	10	6.0	3.0
MKB-010-475-	4.7	10	6.0	1.0	MKD-010-336-	33.0	10	6.0	3.0
MKC Case Size					MKE Case Size				
MKC-050-684-*	.68	50	4.0	2.0	MKE-050-475-*	4.7	50	6.0	3.0
MKC-050-105-	1.0	50	4.0	2.0	MKE-035-685-	6.8	35	6.0	3.0
MKC-050-155-	1.5	50	6.0	2.0	MKE-025-106-	10.0	25	6.0	3.0
MKC-035-225-	2.2	35	6.0	2.0	MKE-020-156-	15.0	20	6.0	3.0
MKC-025-335-	3.3	25	6.0	2.0	MKE-020-226-	22.0	20	6.0	3.0
MKC-025-475-	4.7	25	6.0	2.0	MKE-015-336-	33.0	15	6.0	3.0
MKC-020-685-	6.8	20	6.0	2.0	MKE-010-476-	47.0	10	6.0	3.0

*Tolerance is indicated by adding suffix "20" for $\pm 20\%$, "10" for $\pm 10\%$, or "05" for $\pm 5\%$, i.e. MKA-050-104-20, MKC-025-475-05, etc.

PART NUMBER EXPLANATION

MK	A	—	050	—	104	—	10	—	S
Series Designator	Case Size		Rated Voltage		Capacitance in pF. First two digits are significant figures. Third digit is the number of zeros following.		20 = $\pm 20\%$ 10 = $\pm 10\%$ 05 = $\pm 5\%$		S = Solder coated terminals G = Gold plated terminals

CORNING Glass Capacitors

CORNING

In most types of electronic equipment, the occasional failure of a capacitor is tolerable — though it is inconvenient and often costly. For these applications, an acceptable level of reliability is provided by many of the excellent types of capacitors available today. But in a few designs you can't stand failures — satellite systems, undersea cable repeaters, mountaintop microwave relay stations, to name just a few. For these designs, Corning glass capacitors may be the optimum choice.

Where reliability is critical and replacement of a failed part is not possible or practical, consider glass capacitors.

Where stability is essential, even in severe environments, consider glass capacitors.

RELIABILITY

Corning glass capacitors are qualified to MIL-C-11272 and MIL-C-23269, failure rate levels L, M and S.

For the maximum in reliability, Corning makes the CYFR series, designed to Minuteman specifications. CYFR series glass capacitors meet or exceed all requirements of Corning specifications J-950 and J-951, available on request.

The reasons for the high reliability of glass capacitors are straightforward.

- Simple construction — few things to go wrong.
- Glass dielectric — one of the most stable, inert materials available.
- Thorough inspection — every glass capacitor is individually inspected during production. This testing includes visual inspection, capacitance check, rated voltage check, and hermetic seal check (for glass case types).

Corning glass capacitors have been used in virtually all critical military and space programs for the past twenty-five years. Increasingly, they are also being used in non-military applications where failures can't be tolerated.

STABILITY

Capacitor stability, or lack of it, is an inherent characteristic of the dielectric used. Few materials can match glass for stability, and few companies can match Corning Glass Works for glass technology.

Glass doesn't corrode or degrade in any way. Glass is not subject to micro-fractures, delaminations, and other problems associated with certain crystalline materials.

In addition, axial glass capacitors are hermetically encased in glass, with a true glass-to-metal seal at the leads. This construction is practically immune to severe environmental effects such as shock, vibration, moisture, salt spray and solder heat.

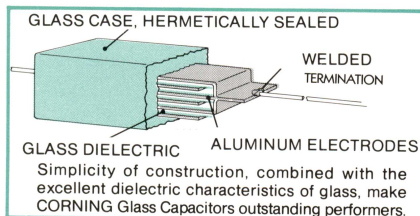
PREDICTABILITY

The dielectric is formed as a continuous thin ribbon of glass. Physical and electrical properties and dimensions are precisely controlled.

This results in every Corning glass capacitor being just like every other, part-to-part and lot-to-lot. Couple this built-in predictability with complete performance specifications and you know what performance to expect before the first prototype is built.

CONSTRUCTION

Simplicity is the key to reliable construction. There are only three materials in axial glass capacitors: glass dielectric and case, aluminum foil electrodes, and wire leads. (Radial capacitors have a molded case.)



The leads are welded to the electrodes so there are no pressure connections to come loose and no solder connections to melt.

PERFORMANCE

Qualified to MIL-C-11272, standard military specifications, and used in industrial applications:

CY10, CY15, CY20, CY30 — Axial Leads
CY06, CY07, CY08 — Radial Leads

Qualified to MIL-C-23269, established reliability specifications, used primarily in military applications:

CYR10, CYR15, CYR20, CYR30 — Axial Leads

CYR51, CYR52, CYR53 — Radial Leads

Produced in accordance with Corning Specification J-950 and used primarily in ultra-high reliability applications.

CYFR10, CYFR15, CYFR20, CYFR30 — Axial Leads

Although all Corning glass capacitors are of similar construction, performance characteristics vary slightly between axial and radial types due to differences in form factor and lead configuration. The performance descriptions and curves that follow are identified as applying to axial or radial types or both.

Temperature Coefficient: The actual temperature coefficient for all Corning glass capacitors is shown in Figure 1. It is a slightly nonlinear curve varying from +115ppm/°C at -55°C to +165ppm/°C at 125°C. Temperature coefficient can be accurately represented by the linear approximation 140±25ppm/°C.

Temperature coefficient is not affected by DC bias voltage nor by measurement frequency over the range of 1kHz to 1MHz. There is no hysteresis in the T.C. curve and part-to-part and lot-to-lot variations are no greater than ±5ppm.

Capacitance drift over the temperature range -55°C to 125°C is no greater than 0.1% or 0.1pF, whichever is larger.

Capacitance Change vs. Temperature: Derived from the T.C. curve, ΔC vs. temperature is shown in Figure 2 for both axials and radials.

Losses vs. Temperature: Maximum dissipation factor (DF) is 0.1% at 1.0kHz and 25°C. The variation of DF vs. temperature is shown in Figure 3 for radials and Figure 4 for axials. There is no significant variation in DF or Q

with different capacitance values when measured at 1.0kHz. See losses vs. capacitance, below, for variations with capacitance value when measured at 1.0MHz.

Insulation Resistance vs. Temperature: Insulation resistance is greater than 100,000 megohms at 25°C (500,000 megohms for the CYFR series). At 125°C, insulation resistance is greater than 10,000 megohms.

Capacitance Change vs. Frequency: Capacitance change vs. frequency is typically less than one per cent up to 1MHz. See Figure 5.

Losses vs. Frequency: Dissipation factor at 1.0kHz and 25°C is 0.1% maximum for all axials and for radials greater than 100pF. DF is 0.2% for radials 100pF and below. The variation of DF and its reciprocal Q vs. frequency is shown in Figure 6 for radials and Figure 7 for axials. There is no significant variation in DF or Q with capacitance value when measured at 1.0kHz. See below for losses vs. capacitance value when measured at 1.0MHz.

Losses vs. Capacitance Value: The variation of Q with capacitance value when measured at 1.0MHz is shown in Figure 8 for radials and Figure 9 for axials.

Resonant Frequency vs. Capacitance Value: The frequency at which the capacitor becomes self-resonant is a function of both capacitance value and lead length. Typical curves are given in Figure 10 for radials and Figure 11 for axials.

Voltage Coefficient: Voltage coefficient is zero. There is no measurable change in capacitance from 0 to fully working voltage. Voltage coefficient remains zero over the full temperature range and at all useful frequencies.

Surge Voltage: CYR types are tested in accordance with MIL-C-23269 and withstand a surge voltage of 1500±30 VDC.

Temperature Range: The operating temperature range for all glass capacitors is -55°C to 125°C with no voltage derating required.

Moisture Resistance: Meets or exceeds all requirements of MIL-C-11272, MIL-C-23269 or J-950 as applicable.

Life: When tested under accelerated conditions of 125°C with 150% of rated voltage applied for 2,000 hours, glass capacitors meet the requirements listed below. Pre- and post-test measurements are at 25°C.

Capacitance Change — Less than 0.5% or 0.5pF, whichever is greater, for all glass capacitors.

Dissipation Factor —

CY10, 15, 20, 30 — 0.20% maximum
CY06, 07, 08 — 0.25% maximum for values above 100

— 0.45 maximum for 100pF and below.

CYR10, 15, 20, 30 — 0.15% maximum

CYR51, 52, 53 — 0.25% maximum for values above 100pF

— 0.45% maximum for 100pF and below.

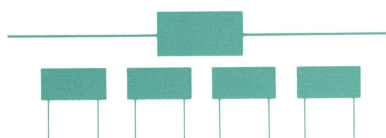
CYFR10, 15, 20, 30 — 0.15% maximum

Insulation Resistance: Greater than 100,000 megohms (500,000 megohms for CYFR series.)

GLASS CAPACITORS

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For the following:

- Placement of orders
- Price quotations
- Delivery
- Specifications or drawing reviews
- Samples
- Location of a franchised distributor
- Technical information
 - Product capabilities
 - Applications assistance

Contact:**Customer Service**

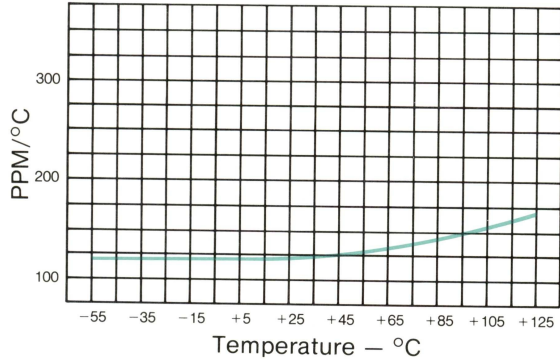
Corning Glass Works
 3900 Electronics Drive
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 TLX — 579411
 TWX — 510-928-1840

Customer Engineering

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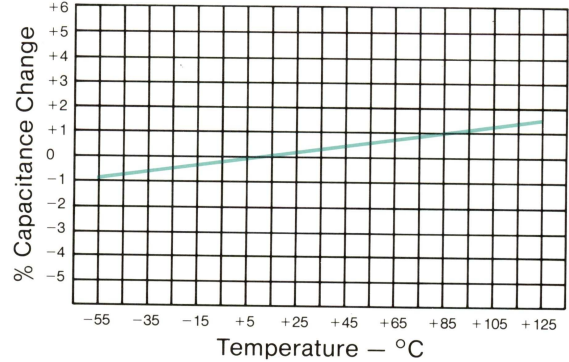
PERFORMANCE CURVES FOR GLASS CAPACITORS

FIGURE 1



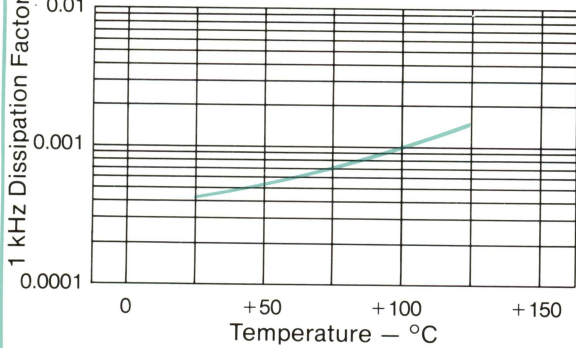
**Temperature Coefficient vs. Temperature
Radial and Axial**

FIGURE 2



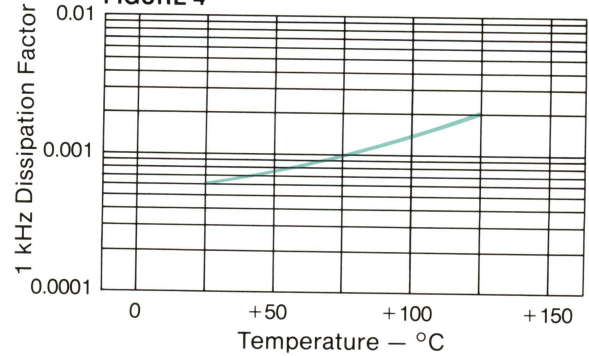
**% Capacitance Change vs. Temperature
Radial and Axial**

FIGURE 3



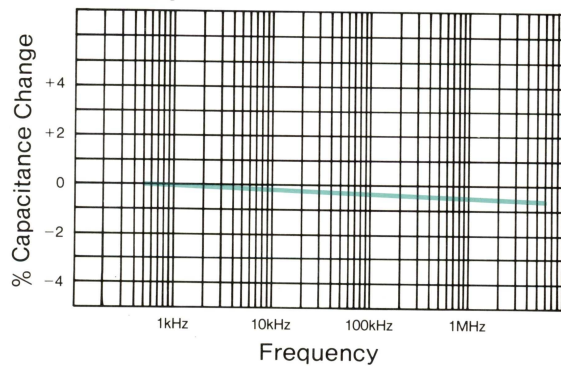
**Dissipation Factor vs. Temperature
Radial**

FIGURE 4



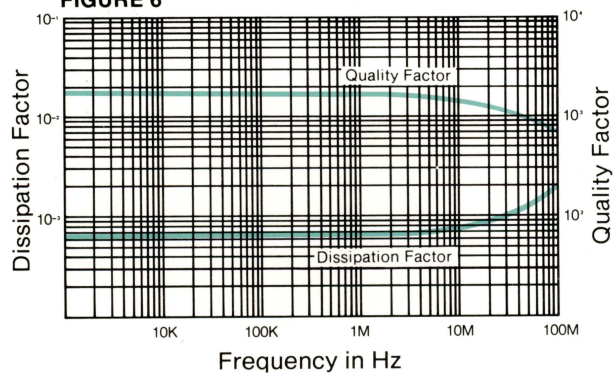
**Dissipation Factor vs. Temperature
Axial**

FIGURE 5



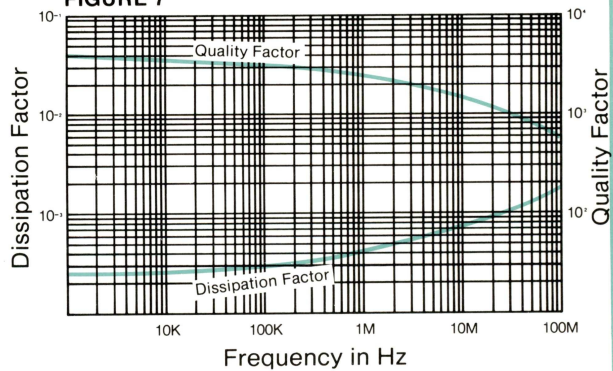
**% Capacitance Change vs. Frequency
Radial and Axial**

FIGURE 6



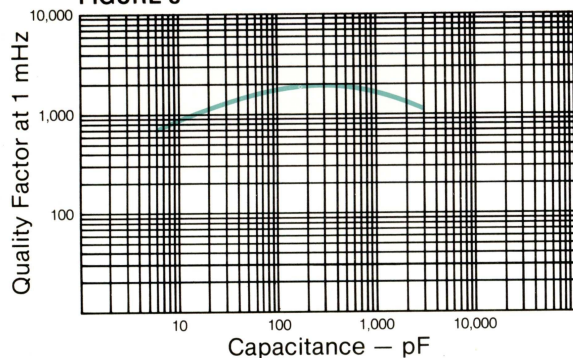
Quality Factor and Dissipation Factor vs. Frequency
Radial

FIGURE 7



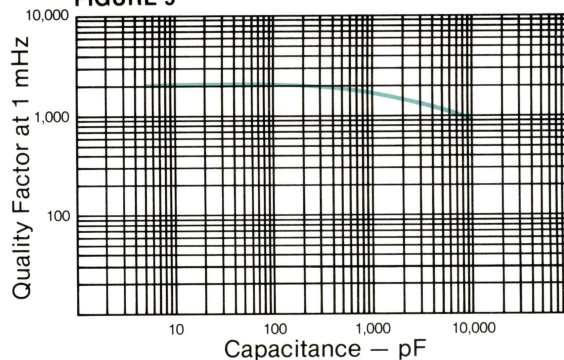
Quality Factor and Dissipation Factor vs. Frequency
Axial

FIGURE 8



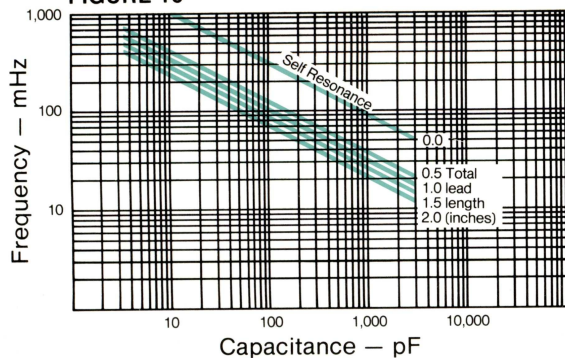
Quality Factor vs. Capacitance
Radial

FIGURE 9



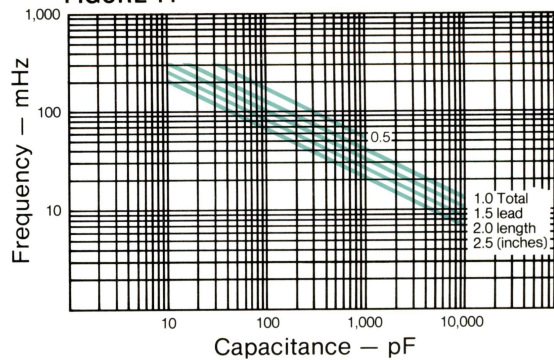
Quality Factor vs. Capacitance
Axial

FIGURE 10



Resonant Frequency vs. Capacitance
Radial

FIGURE 11



Resonant Frequency vs. Capacitance
Axial

Glass Capacitors

CORNING

CY10, 15, 20, 30 (QPL to MIL-C-11272)
CYFM10, 15, 20, 30 (INDUSTRIAL)

APPLICATIONS

These extremely stable glass capacitors, CORNING® style CYFM, meet or exceed all requirements of MIL-C-11272. With glass dielectric, fused monolithic construction and true glass-to-metal seals at the leads, they have very low losses and are virtually immune to severe environmental stresses.

PERFORMANCE CHARACTERISTICS

Tolerance — Available tolerances for each value of capacitance are shown in the ordering information table. For codes, refer to the Part Numbers paragraph.

Temperature Coefficient — $+140 \pm 25$ ppm/°C at 100 kHz. TC will track and retrace to within ± 5 ppm. Capacitance drift is less than 0.1% or 0.1 pF whichever is greater.

Voltage Coefficient — zero

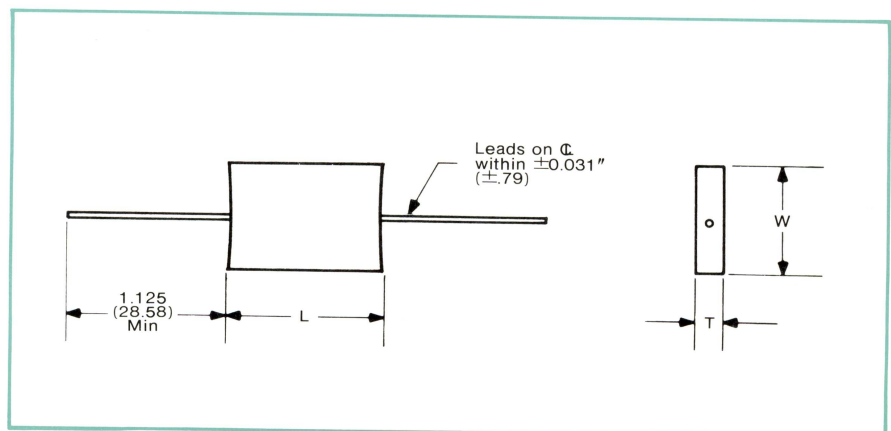
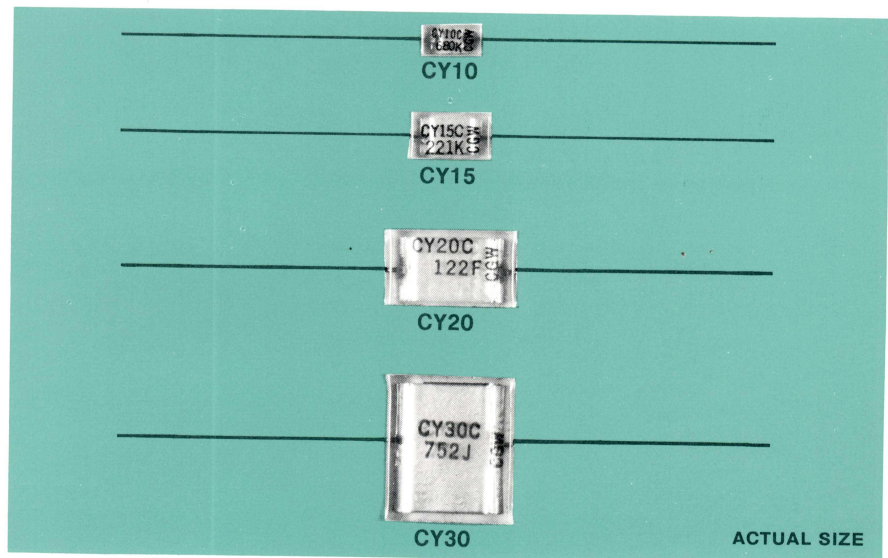
Losses — Extremely low, and remain relatively low at elevated temperatures. Dissipation factor is not more than 0.001 at 1.0 kHz and 25°C.

Life — After 2,000 hours at 125°C with 150% of rated voltage applied, capacitance change is less than 0.5% or 0.5 pF whichever is greater.

Insulation Resistance — Greater than 100,000 megohms at 25°C; greater than 10,000 megohms at 125°C.

Voltage/Temperature Ratings — Voltage ratings are shown in the ordering information table. The operating temperature range is -55°C to $+125^{\circ}\text{C}$ with no derating required.

Moisture Resistance — Meets or exceeds all requirements of MIL-C-11272 and MIL-STD-202, Method 106.



Dimensions — Inches (Millimeters)					
Case Size	L	W	T	Lead Dia. +.004 (+0.1) -.001 (-0.03)	Weight (Grams)
CY10	.344 ± .047 (8.74 ± 1.19)	.172 ± .031 (4.37 ± .79)	.078 ± .031 (1.98 ± .79)	.020 (.51)	.25 - .50
CY15	.469 ± .047 (11.91 ± 1.19)	.266 ± .031 (6.76 ± .79)	.109 ± .047 (2.77 ± 1.19)	.020 (.51)	.75 - 1.25
CY20	.734 ± .062 (18.64 ± 1.57)	.422 ± .047 (10.72 ± 1.19)	.141 ± .047 (3.58 ± 1.19)	.025 (.63)	2.50 - 4.00
CY30	.766 ± .062 (19.46 ± 1.57)	.750 ± .078 (19.05 ± 1.98)	.141 ± .047 (3.58 ± 1.19)	.025 (.63)	5.00 - 7.00

NOTE: Standard leads are solder-coated Dumet.

Glass Capacitors

CORNING

CY06, 07, 08 (QPL to MIL-C-11272)
TY06, 07, 08 (INDUSTRIAL)

APPLICATIONS

These precision miniature glass capacitors, CORNING® style TY0, meet or exceed all requirements of MIL-C-11272. Constructed of a fused monolithic capacitive element in a rectangular case with gold-plated radial Dumet leads, this series permits high packaging efficiency for printed circuit applications where extremely stable, low-loss capacitors are required.

PERFORMANCE CHARACTERISTICS

Tolerance — Available tolerances for each value of capacitance are shown in the ordering information table. For codes, refer to the Part Numbers paragraph.

Temperature Coefficient — $+140 \pm 25$ ppm/°C at 100 kHz. TC will track and retrace to within ± 5 ppm. Capacitance drift is less than 0.1% or 0.1 pF, whichever is greater.

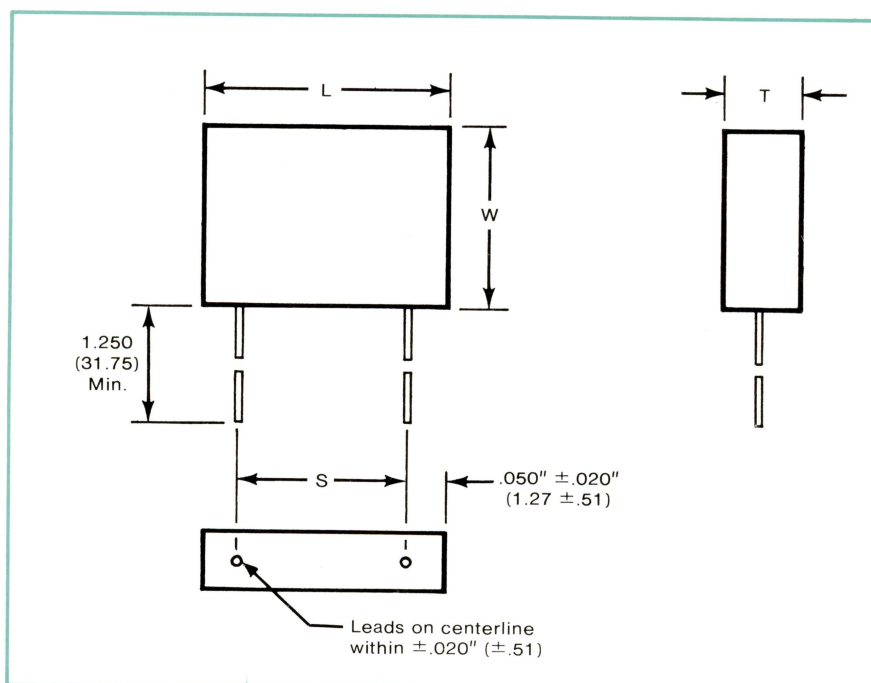
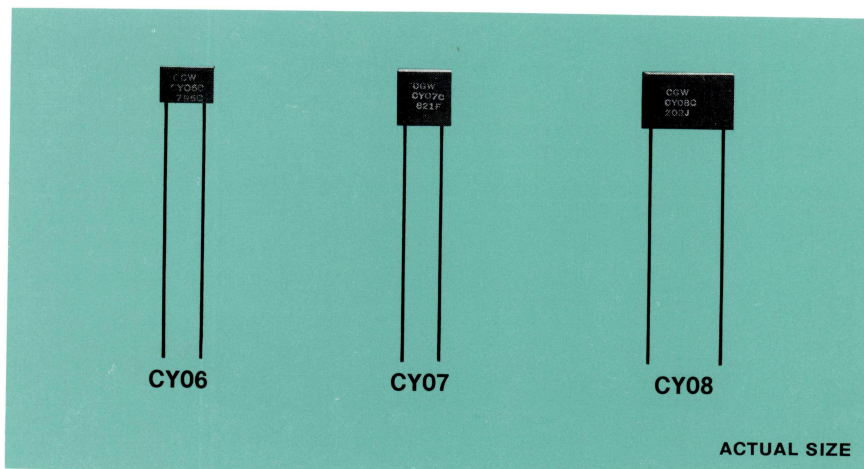
Voltage Coefficient — Zero.

Losses — Extremely low, and remain relatively low at elevated temperatures. Dissipation factor at 1 kHz and 25°C is less than 0.001 for values greater than 100 pF and less than 0.002 for values of 100 pF and below.

Life — After 2,000 hours at 125°C with 150% of rated voltage applied, capacitance change is less than 0.5% or 0.5 pF; dissipation factor is less than 0.0025 for values above 100 pF and less than 0.0045 for values of 100 pF and below; insulation resistance is greater than 100,000 megohms.

Insulation Resistance — Greater than 100,000 megohms at 25°C; greater than 10,000 megohms at 125°C.

Voltage/Temperature Rating — 300 WVDC over the temperature range of -55°C to +125°C with no derating required.



Dimensions — Inches (Millimeters)

Case Size	L $\pm .005$ ($\pm .13$)	W $\pm .010$ ($\pm .25$)	T $\pm .005$ ($\pm .13$)	S $\pm .020$ ($\pm .51$)	Weight (Grams)
CY06	.300 (7.62)	.200 (5.08)	.115 (2.92)	.200 (5.08)	.3 — .4
CY07	.300 (7.62)	.300 (7.62)	.115 (2.92)	.200 (5.08)	.4 — .5
CY08	.500 (12.70)	.300 (7.62)	.115 (2.92)	.400 (10.16)	.7 — .8

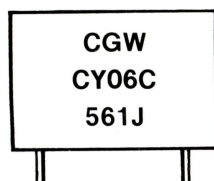
Note: All leads are 24 AWG, $.020 \pm .002$ ($.51 \pm .05$) diameter. Leads are solderable and weldable gold-plated Dumet, per MIL-STD-1276, Type D.

PART NUMBERS AND ORDERING INFORMATION

Capacitance Value (pF)	Military Type Designation	Corning Part No.	DC Working Voltage	Tolerances Available	Capacitance Value (pF)	Military Type Designation	Corning Part No.	DC Working Voltage	Tolerances Available
STANDARD VALUES CY06					STANDARD VALUES CY06				
1.0	CY06C010 *	TY06C010 *	300	C,D	91	CY06C910 *	TY06C910 *	300	F,G,J,K,M
1.5	CY06C1R5 —	TY06C1R5 —	300	C,D	100	CY06C101 —	TY06C101 —	300	F,G,J,K,M
2.2	CY06C2R2 —	TY06C2R2 —	300	C,D	110	CY06C111 —	TY06C111 —	300	F,G,J,K,M
2.7	CY06C2R7 —	TY06C2R7 —	300	C,D	120	CY06C121 —	TY06C121 —	300	F,G,J,K,M
3.0	CY06C030 —	TY06C030 —	300	C,D	130	CY06C131 —	TY06C131 —	300	F,G,J,K,M
3.3	CY06C3R3 —	TY06C3R3 —	300	C,D	150	CY06C151 —	TY06C151 —	300	F,G,J,K,M
3.6	CY06C3R6 —	TY06C3R6 —	300	C,D	160	CY06C161 —	TY06C161 —	300	F,G,J,K,M
3.9	CY06C3R9 —	TY06C3R9 —	300	C,D	180	CY06C181 —	TY06C181 —	300	F,G,J,K,M
4.3	CY06C4R3 —	TY06C4R3 —	300	C,D	200	CY06C201 —	TY06C201 —	300	F,G,J,K,M
4.7	CY06C4R7 —	TY06C4R7 —	300	C,K	220	CY06C221 —	TY06C221 —	300	F,G,J,K,M
5.1	CY06C5R1 —	TY06C5R1 —	300	C,J,K	240	CY06C241 —	TY06C241 —	300	F,G,J,K,M
5.6	CY06C5R6 —	TY06C5R6 —	300	C,J,K	270	CY06C271 —	TY06C271 —	300	F,G,J,K,M
6.2	CY06C6R2 —	TY06C6R2 —	300	C,J,K	300	CY06C301 —	TY06C301 —	300	F,G,J,K,M
6.8	CY06C6R8 —	TY06C6R8 —	300	C,J,K	330	CY06C331 —	TY06C331 —	300	F,G,J,K,M
7.5	CY06C7R5 —	TY06C7R5 —	300	C,J,K	360	CY06C361 —	TY06C361 —	300	F,G,J,K,M
8.2	CY06C8R2 —	TY06C8R2 —	300	C,J,K	390	CY06C391 —	TY06C391 —	300	F,G,J,K,M
9.1	CY06C9R1 —	TY06C9R1 —	300	C,J,K	430	CY06C431 —	TY06C431 —	300	F,G,J,K,M
10	CY06C100 —	TY06C100 —	300	C,J,K,M	470	CY06C471 —	TY06C471 —	300	F,G,J,K,M
11	CY06C110 —	TY06C110 —	300	C,J,K,M	510	CY06C511 —	TY06C511 —	300	F,G,J,K,M
12	CY06C120 —	TY06C120 —	300	C,J,K,M	560	CY06C561 —	TY06C561 —	300	F,G,J,K,M
13	CY06C130 —	TY06C130 —	300	C,G,J,K,M	STANDARD VALUES CY07				
15	CY06C150 —	TY06C150 —	300	C,G,J,K,M	620	CY07C621 *	TY07C621 *	300	F,G,J,K,M
16	CY06C160 —	TY06C160 —	300	C,G,J,K,M	680	CY07C681 —	TY07C681 —	300	F,G,J,K,M
18	CY06C180 —	TY06C180 —	300	C,G,J,K,M	750	CY07C751 —	TY07C751 —	300	F,G,J,K,M
20	CY06C200 —	TY06C200 —	300	C,G,J,K,M	820	CY07C821 —	TY07C821 —	300	F,G,J,K,M
22	CY06C220 —	TY06C220 —	300	C,G,J,K,M	910	CY07C911 —	TY07C911 —	300	F,G,J,K,M
24	CY06C240 —	TY06C240 —	300	C,G,J,K,M	1000	CY07C102 —	TY07C102 —	300	F,G,J,K,M
27	CY06C270 —	TY06C270 —	300	F,G,J,K,M	STANDARD VALUES CY08				
30	CY06C300 —	TY06C300 —	300	F,G,J,K,M	1100	CY08C112 *	TY08C112 *	300	F,G,J,K,M
33	CY06C330 —	TY06C330 —	300	F,G,J,K,M	1200	CY08C122 —	TY08C122 —	300	F,G,J,K,M
36	CY06C360 —	TY06C360 —	300	F,G,J,K,M	1300	CY08C132 —	TY08C132 —	300	F,G,J,K,M
39	CY06C390 —	TY06C390 —	300	F,G,J,K,M	1500	CY08C152 —	TY08C152 —	300	F,G,J,K,M
43	CY06C430 —	TY06C430 —	300	F,G,J,K,M	1600	CY08C162 —	TY08C162 —	300	F,G,J,K,M
47	CY06C470 —	TY06C470 —	300	F,G,J,K,M	1800	CY08C182 —	TY08C182 —	300	F,G,J,K,M
51	CY06C510 —	TY06C510 —	300	F,G,J,K,M	2000	CY08C202 —	TY08C202 —	300	F,G,J,K,M
56	CY06C560 —	TY06C560 —	300	F,G,J,K,M	2200	CY08C222 —	TY08C222 —	300	F,G,J,K,M
62	CY06C620 —	TY06C620 —	300	F,G,J,K,M	2400	CY08C242 —	TY08C242 —	300	F,G,J,K,M
68	CY06C680 —	TY06C680 —	300	F,G,J,K,M					
75	CY06C750 —	TY06C750 —	300	F,G,J,K,M					
82	CY06C820 —	TY06C820 —	300	F,G,J,K,M					

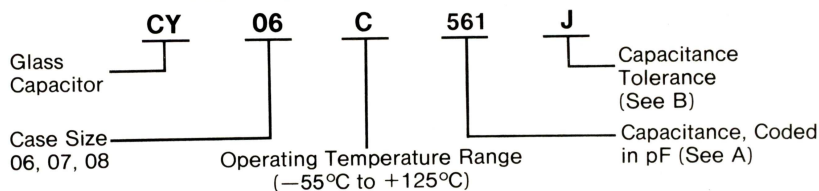
*Add letter for tolerance code above lines.

PART MARKING



CGW — Corning Glass Works
CY — Glass Capacitor
06 — Case Size
C — Operating Temperature Range
561 — Capacitance, Coded in pF
J — Tolerance

PART NUMBER EXPLANATION



A. Capacitance Code is expressed in picofarads (pF). The first two digits represent significant figures and the third digit specifies the number of zeros to follow; i.e. 561 indicates 560 pF. For values below 10 pF, R = decimal point; i.e. 1R5 indicates 1.5 pF.

B. Tolerance Code:

C = $\pm 25\%$ pF F = $\pm 1\%$ J = $\pm 5\%$
D = $\pm 50\%$ pF G = $\pm 2\%$ K = $\pm 10\%$
M = $\pm 20\%$

Glass Capacitors

CORNING

CYFR 10, 15, 20, 30 (HIGH RELIABILITY)

APPLICATIONS

CORNING® style CYFR high reliability glass capacitors have failure rates among the lowest available. Outstanding stability, reliability and electrical performance are provided by the fused monolithic construction, which is virtually immune to environmental stresses. These capacitors meet or exceed all requirements of Corning specifications J-950 and J-951, which combine the most exacting features of many specifications and substantially exceed most.

PERFORMANCE CHARACTERISTICS

Tolerance — Available tolerances for each value of capacitance are shown in the Ordering Information table. For codes, refer to the Part Numbers paragraph.

Temperature Coefficient — $+140 \pm 25$ ppm/°C at 100 kHz. TC will track and retrace to within ± 5 ppm. Capacitance drift is less than 0.1% or 0.1 pf, whichever is greater.

Voltage Coefficient — Zero.

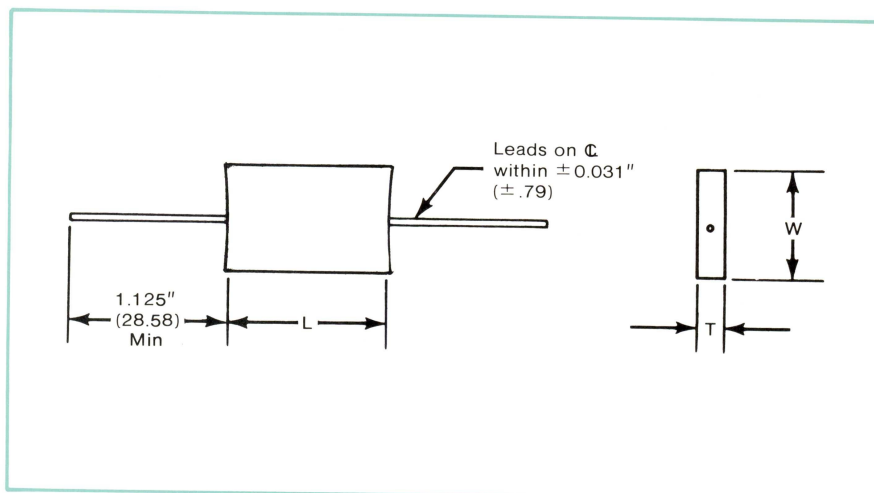
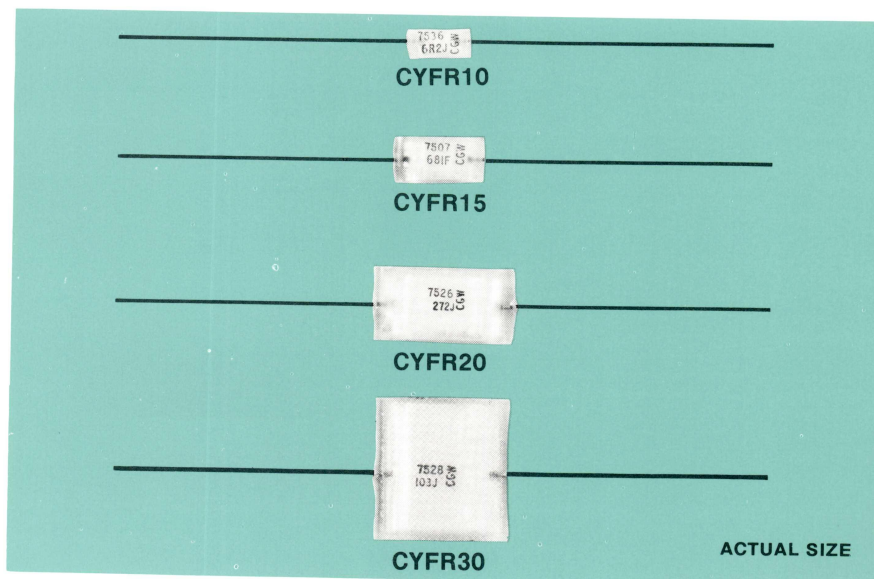
Losses — Extremely low, and remain relatively low at elevated temperatures and high frequencies. Dissipation factor is less than 0.001 at 1 kHz and 25°C.

Life — After 2,000 hours at 125°C with 150% of rated voltage applied, capacitance change is less than 0.5% or 0.5 pf, dissipation factor is less than 0.0015, and insulation resistance is greater than 500,000 megohms.

Insulation Resistance — Greater than 500,000 megohms at 25°C; greater than 10,000 megohms at 125°C.

Voltage/Temperature Ratings — Voltage ratings are shown in the ordering information table. The operating temperature range is -55°C to $+125^{\circ}\text{C}$ with no derating required.

Moisture Resistance — Meets or exceeds all requirements of J-951 and MIL-STD-202, Method 106 for 50 cycles.



Dimensions — Inches (Millimeters)

Case Size	L	W	T	Lead Dia. +.004 (+0.1) -.001 (-0.03)	Weight (Grams)
CYFR10	.344 ± .047 (8.74 ± 1.19)	.172 ± .031 (4.37 ± .79)	.078 ± .031 (1.98 ± .79)	.020 (.51)	.25 - .50.
CYFR15	.469 ± .047 (11.91 ± 1.19)	.266 ± .031 (6.76 ± .79)	.109 ± .047 (2.77 ± 1.19)	.020 (.51)	.75 - 1.25
CYFR20	.734 ± .062 (18.64 ± 1.57)	.422 ± .047 (10.72 ± 1.19)	.141 ± .047 (3.58 ± 1.19)	.025 (.63)	2.50 - 4.00
CYFR30	.766 ± .062 (19.46 ± 1.57)	.750 ± .078 (19.05 ± 1.98)	.141 ± .047 (3.58 ± 1.19)	.025 (.63)	5.00 - 7.00

NOTE: Leads are solderable and weldable gold-plated Dumet.

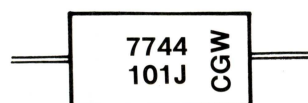
PART NUMBERS AND ORDERING INFORMATION

Capacitance Value (pF)	Corning Part Number	DC Working Voltage	Tolerances Available	Capacitance Value (pF)	Corning Part Number	DC Working Voltage	Tolerances Available
STANDARD VALUES CYFR10				STANDARD VALUES CYFR15, con't.			
0.5	CYFR10_0R5_**	500	C	240	CYFR15_241_**	500	F,G,J
1.0	CYFR10_010_—	500	C	270	CYFR15_271_—	500	F,G,J
1.5	CYFR10_1R5_—	500	C	300	CYFR15_301_—	500	F,G,J
2.2	CYFR10_2R2_—	500	C,D	330	CYFR15_331_—	500	F,G,J
2.7	CYFR10_2R7_—	500	C	360	CYFR15_361_—	500	F,G,J
3.0	CYFR10_030_—	500	C,D	390	CYFR15_391_—	500	F,G,J
3.3	CYFR10_3R3_—	500	C	430	CYFR15_431_—	500	F,G,J
3.6	CYFR10_3R6_—	500	C,D	470	CYFR15_471_—	500	F,G,J
3.9	CYFR10_3R9_—	500	C	510	CYFR15_511_—	500	F,G,J
4.3	CYFR10_4R3_—	500	C,D	560	CYFR15_561_—	300	F,G,J
4.7	CYFR10_4R7_—	500	C	620	CYFR15_621_—	300	F,G,J
5.1	CYFR10_5R1_—	500	C	680	CYFR15_681_—	300	F,G,J
5.6	CYFR10_5R6_—	500	C	750	CYFR15_751_—	300	F,G,J
6.2	CYFR10_6R2_—	500	C,J	820	CYFR15_821_—	300	F,G,J
6.8	CYFR10_6R8_—	500	C,J	910	CYFR15_911_—	300	F,G,J
7.5	CYFR10_7R5_—	500	C,J	1000	CYFR15_102_—	300	F,G,J
8.2	CYFR10_8R2_—	500	C,J	1100	CYFR15_112_—	300	F,G,J
9.1	CYFR10_9R1_—	500	C,J	1200	CYFR15_122_—	300	F,G,J
10	CYFR10_100_—	500	C,J	STANDARD VALUES CYFR20			
11	CYFR10_110_—	500	C,J	560	CYFR20_561_**	500	F,G,J
12	CYFR10_120_—	500	C,J	620	CYFR20_621_—	500	F,G,J
13	CYFR10_130_—	500	G,J	680	CYFR20_681_—	500	F,G,J
15	CYFR10_150_—	500	G,J	750	CYFR20_751_—	500	F,G,J
16	CYFR10_160_—	500	G,J	820	CYFR20_821_—	500	F,G,J
18	CYFR10_180_—	500	G,J	910	CYFR20_911_—	500	F,G,J
20	CYFR10_200_—	500	G,J	1000	CYFR20_102_—	500	F,G,J
22	CYFR10_220_—	500	G,J	1100	CYFR20_112_—	500	F,G,J
24	CYFR10_240_—	500	G,J	1200	CYFR20_122_—	500	F,G,J
27	CYFR10_270_—	500	F,G,J	1300	CYFR20_132_—	500	F,G,J
30	CYFR10_300_—	500	F,G,J	1500	CYFR20_152_—	500	F,G,J
33	CYFR10_330_—	500	F,G,J	1600	CYFR20_162_—	500	F,G,J
36	CYFR10_360_—	500	F,G,J	1800	CYFR20_182_—	500	F,G,J
39	CYFR10_390_—	500	F,G,J	2000	CYFR20_202_—	500	F,G,J
43	CYFR10_430_—	500	F,G,J	2200	CYFR20_222_—	500	F,G,J
47	CYFR10_470_—	500	F,G,J	2400	CYFR20_242_—	500	F,G,J
51	CYFR10_510_—	500	F,G,J	2700	CYFR20_272_—	500	F,G,J
56	CYFR10_560_—	500	F,G,J	3000	CYFR20_302_—	500	F,G,J
62	CYFR10_620_—	500	F,G,J	3300	CYFR20_332_—	500	F,G,J
68	CYFR10_680_—	500	F,G,J	3600	CYFR20_362_—	300	F,G,J
75	CYFR10_750_—	500	F,G,J	3900	CYFR20_392_—	300	F,G,J
82	CYFR10_820_—	500	F,G,J	4300	CYFR20_432_—	300	F,G,J
91	CYFR10_910_—	500	F,G,J	4700	CYFR20_472_—	300	F,G,J
100	CYFR10_101_—	500	F,G,J	5100	CYFR20_512_—	300	F,G,J
110	CYFR10_111_—	500	F,G,J	STANDARD VALUES CYFR30			
120	CYFR10_121_—	500	F,G,J	3600	CYFR30_362_**	500	F,G,J
130	CYFR10_131_—	500	F,G,J	3900	CYFR30_392_—	500	F,G,J
150	CYFR10_151_—	500	F,G,J	4300	CYFR30_432_—	500	F,G,J
160	CYFR10_161_—	300	F,G,J	4700	CYFR30_472_—	500	F,G,J
180	CYFR10_181_—	300	F,G,J	5100	CYFR30_512_—	500	F,G,J
200	CYFR10_201_—	300	F,G,J	5600	CYFR30_562_—	500	F,G,J
220	CYFR10_221_—	300	F,G,J	6200	CYFR30_622_—	500	F,G,J
240	CYFR10_241_—	300	F,G,J	6800	CYFR30_682_—	300	F,G,J
STANDARD VALUES CYFR15				7500	CYFR30_752_—	300	F,G,J
160	CYFR15_161_**	500	F,G,J	8200	CYFR30_822_—	300	F,G,J
180	CYFR15_181_—	500	F,G,J	9100	CYFR30_912_—	300	F,G,J
200	CYFR15_201_—	500	F,G,J	10000	CYFR30_103_—	300	F,G,J
220	CYFR15_221_—	500	F,G,J				

*Add S or G for lead finish

**Add letter for tolerance code

PART MARKING



77 — Year
 44 — Lot Code
 101 — Capacitance, Coded in pF
 J — Tolerance
 CGW — Corning Glass Works

PART NUMBER EXPLANATION

CYFR 10 G 101 J A Test Level
 High Reliability Glass Capacitor
 Case Size 10, 15, 20, 30
 Lead Finish
 S = Solder Coated Dumet
 G = Gold Plated Dumet (50 μ inch minimum)

A. Capacitance Code is expressed in picofarads (pF). The first two digits represent significant figures and the third digit specifies the number of zeros to follow; i.e. 561 indicates 560 pF. For fractional values below 10pF, R = decimal point; i.e. 1R5 indicates 1.5 pF.

B. Tolerance Code:

C = $\pm .25$ pF
 D = $\pm .50$ pF
 F = $\pm 1\%$
 G = $\pm 2\%$
 J = $\pm 5\%$

Glass Capacitors

CORNING

M23269/01, 02, 03, 04 (QPL TO MIL-C-23269)
CYR10, 15, 20, 30, (ESTABLISHED RELIABILITY)
FAILURE RATE LEVELS L, M, AND S

APPLICATIONS

These precision glass-dielectric capacitors are QPL to Established Reliability specification MIL-C-23269. Fused monolithic construction provides excellent electrical performance, environmental immunity, stability and retraceability. These capacitors have axial leads.

PERFORMANCE CHARACTERISTICS

Temperature Coefficient — $+140 \pm 25$ ppm/°C from -55°C to $+125^{\circ}\text{C}$. TC of all units will track and retrace to within ± 5 ppm.

Life — At rated conditions (100% rated voltage, 125°C), capacitance change is less than:

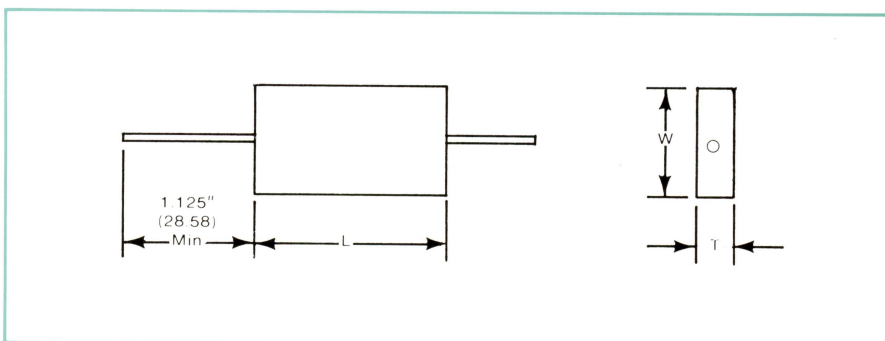
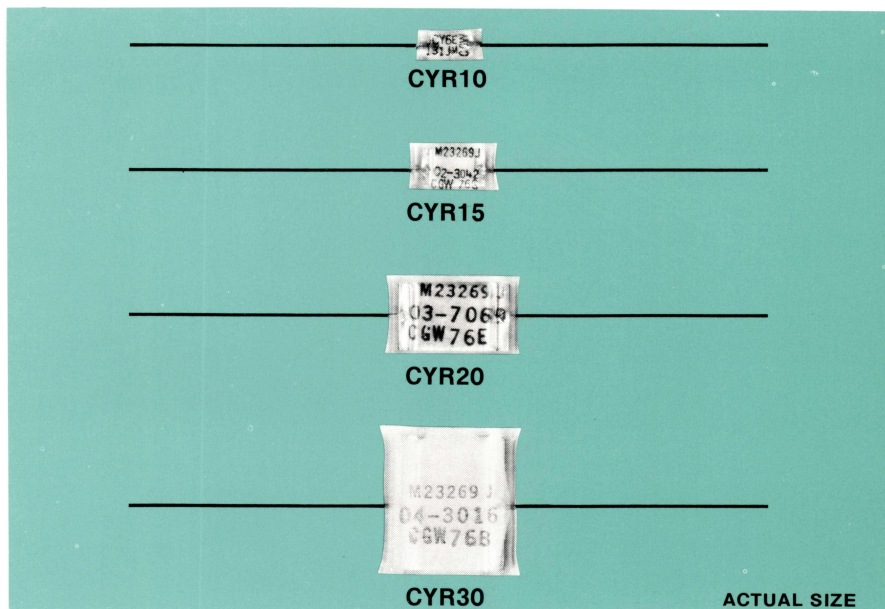
- $\pm 0.5\%$ after 2,000 hours
- $\pm 2.0\%$ after 30,000 hours

At accelerated conditions (150% rated voltage, 125°C), capacitance change is less than:

- $\pm 0.5\%$ after 2,000 hours
- $\pm 2.0\%$ after 6,000 hours

Insulation Resistance — A minimum of 100,000 megohms at 25°C and 10,000 megohms at 125°C .

Voltage/Temperature Ratings — Voltage ratings are shown in the part number tables. The operating temperature range is -55°C to $+125^{\circ}\text{C}$.



Dimensions — Inches (Millimeters)

Case Size	L	W	T	Lead Dia. +.004 (+0.1) -.001 (-0.03)
CYR10	.344 $\pm$.047 (8.74 $\pm$ 1.19)	.172 $\pm$.031 (4.37 $\pm$.79)	.078 $\pm$.031 (1.98 $\pm$.79)	.020 (.51)
CYR15	.469 $\pm$.047 (11.91 $\pm$ 1.19)	.266 $\pm$.031 (6.76 $\pm$.79)	.109 $\pm$.047 (2.77 $\pm$ 1.19)	.020 (.51)
CYR20	.734 $\pm$.062 (18.64 $\pm$ 1.57)	.422 $\pm$.047 (10.72 $\pm$ 1.19)	.141 $\pm$.047 (3.58 $\pm$ 1.19)	.025 (.63)
CYR30	.766 $\pm$.062 (19.46 $\pm$ 1.57)	.750 $\pm$.078 (19.05 $\pm$ 1.98)	.141 $\pm$.047 (3.58 $\pm$ 1.19)	.025 (.63)

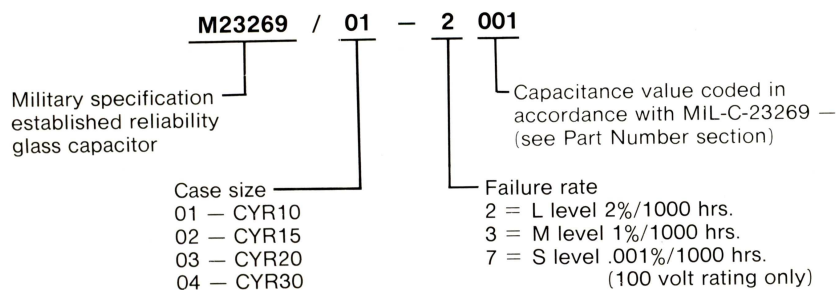
NOTE: Standard leads are solder-coated Dumet.

PART NUMBERS AND ORDERING INFORMATION (AXIAL LEAD)

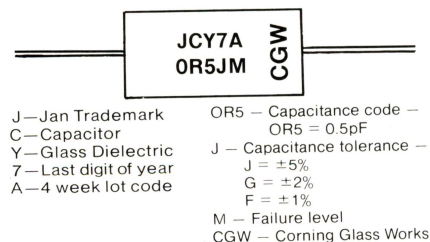
Value (pF)					Part Number* Capacitance Tolerance					Value (pF)					Part Number* Capacitance Tolerance					Value (pF)					Part Number* Capacitance Tolerance																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
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*Add first digit to indicate failure rate.

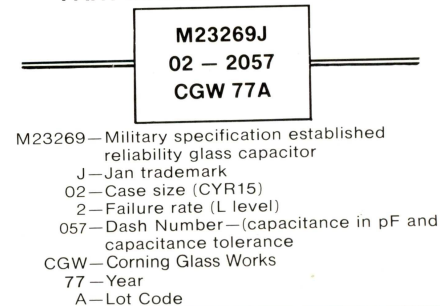
PART NUMBER EXPLANATION FOR CYR10-30



PART MARKING—CYR10



PART MARKING—CYR15-30



Glass Capacitors

CORNING

M23269/10 (QPL TO MIL-C-23269)
CYR51, 52, 53 (ESTABLISHED RELIABILITY)
FAILURE RATE LEVELS L, M

APPLICATIONS

These precision glass-dielectric capacitors are QPL to Established Reliability specification MIL-C-23269. Fused monolithic construction provides excellent electrical performance, environmental immunity, stability and retraceability. These capacitors have radial leads.

PERFORMANCE CHARACTERISTICS

Temperature Coefficient — $+140 \pm 25$ ppm/°C from -55°C to $+125^{\circ}\text{C}$. TC of all units will track and retrace to within ± 5 ppm.

Life — At rated conditions (100% rated voltage, 125°C), capacitance change is less than:

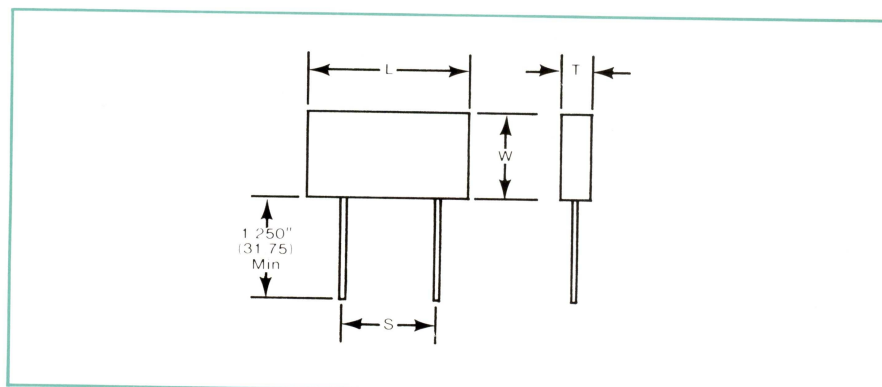
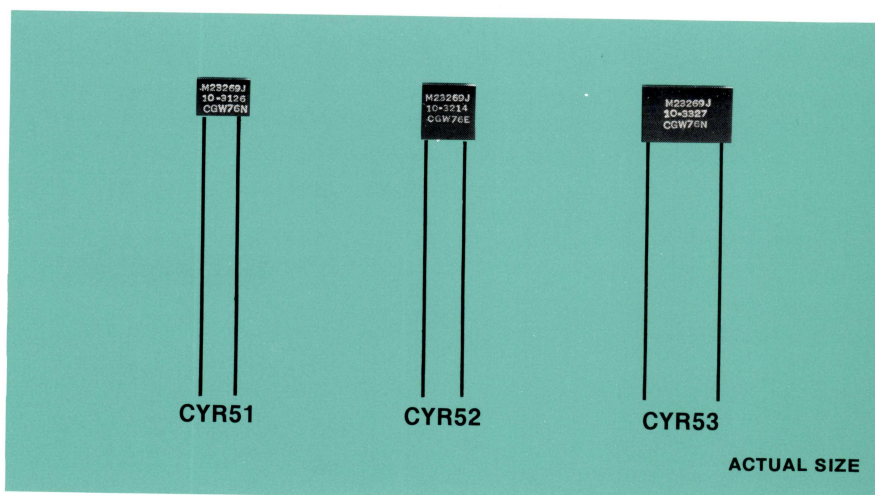
- $\pm 0.5\%$ after 2,000 hours
- $\pm 2.0\%$ after 30,000 hours

At accelerated conditions (150% rated voltage, 125°C), capacitance change is less than:

- $\pm 0.5\%$ after 2,000 hours
- $\pm 2.0\%$ after 6,000 hours

Insulation Resistance — A minimum of 100,000 megohms at 25°C and 10,000 megohms at 125°C .

Voltage/Temperature Ratings — Voltage ratings are shown in the part number tables. The operating temperature range is -55°C to $+125^{\circ}\text{C}$.



Dimensions — Inches (Millimeters)

Case Size	L $\pm .005$ ($\pm .13$)	W $\pm .010$ ($\pm .25$)	T $\pm .005$ ($\pm .13$)	Lead Dia. $\pm .002$ ($\pm .051$)	S $\pm .020$ ($\pm .51$)
CYR51	.300 (7.62)	.200 (5.08)	.115 (2.92)	.020 (.51)	.200 (5.08)
CYR52	.300 (7.62)	.300 (7.62)	.115 (2.92)	.020 (.51)	.200 (5.08)
CYR53	.500 (12.70)	.300 (7.62)	.115 (2.92)	.020 (.51)	.400 (10.16)

NOTE: Leads are solderable and weldable gold-plated Dumet, per MIL-STD-1276, Type D.

PART NUMBERS AND ORDERING INFORMATION (RADIAL LEAD)

Value (pF)	Part Number* Capacitance Tolerance			Value (pF)	Part Number* Capacitance Tolerance			Value (pF)	Part Number* Capacitance Tolerance		
STYLE CYR51 M23269/10-				STYLE CYR51 M23269/10-				STYLE CYR51 M23269/10- (cont'd.)			
300 Volts	±.25pF	± 2%	± 5%	300 Volts	± 1%	± 2%	± 5%	300 Volts	± 1%	± 2%	± 5%
1	*.001	—	—	27	*.052	*.053	*.054	300	*.127	*.128	*.129
1.5	—.002	—	—	30	—.055	—.056	—.057	330	—.130	—.131	—.132
2.2	—.003	—	—	33	—.058	—.059	—.060	360	—.133	—.134	—.135
2.7	—.004	—	—	36	—.061	—.062	—.063	390	—.136	—.137	—.138
3.0	—.005	—	—	39	—.064	—.065	—.066	430	—.139	—.140	—.141
3.3	—.006	—	—	43	—.067	—.068	—.069	470	—.142	—.143	—.144
3.6	—.007	—	—	47	—.070	—.071	—.072	510	—.145	—.146	—.147
3.9	—.008	—	—	51	—.073	—.074	—.075	560	—.148	—.149	—.150
4.3	—.009	—	—	56	—.076	—.077	—.078	STYLE CYR52 M23269/10-			
4.7	—.010	—	—	62	—.079	—.080	—.081	300 Volts	± 1%	± 2%	± 5%
5.1	—.011	—	*.012	68	—.082	—.083	—.084	620	*.201	*.202	*.203
5.6	—.013	—	—.014	75	—.085	—.086	—.087	680	—.204	—.205	—.206
6.2	—.015	—	—.016	82	—.088	—.089	—.090	750	—.207	—.208	—.209
6.8	—.017	—	—.018	91	—.091	—.092	—.093	820	—.210	—.211	—.212
7.5	—.019	—	—.020	100	—.094	—.095	—.096	910	—.213	—.214	—.215
8.2	—.021	—	—.022	110	—.097	—.098	—.099	1000	—.216	—.217	—.218
9.1	—.023	—	—.024	120	—.100	—.101	—.102	STYLE CYR53 M23269/10-			
10	—.025	—	—.026	130	—.103	—.104	—.105	300 Volts	± 1%	± 2%	± 5%
11	—.027	—	—.028	150	—.106	—.107	—.108	1100	*.301	*.302	*.303
12	—.029	—	—.030	160	—.109	—.110	—.111	1200	—.304	—.305	—.306
13	—.031	*.032	—.033	180	—.112	—.113	—.114	1300	—.307	—.308	—.309
15	—.034	—.035	—.036	200	—.115	—.116	—.117	1500	—.310	—.311	—.312
16	—.037	—.038	—.039	220	—.118	—.119	—.120	1600	—.313	—.314	—.315
18	—.040	—.041	—.042	240	—.121	—.122	—.123	1800	—.316	—.317	—.318
20	—.043	—.044	—.045	270	—.124	—.125	—.126	2000	—.319	—.320	—.321
22	—.046	—.047	—.048					2200	—.322	—.323	—.324
24	—.049	—.050	—.051					2400	—.325	—.326	—.327
*Add first digit to indicate failure rate.											

*Add first digit to indicate failure rate.

PART NUMBER EXPLANATION FOR CYR51-53

M23269 / 10 - 2 001

Military specification
established reliability
glass capacitorSlash sheet
for case sizes
CYR51
CYR52
CYR53Capacitance value coded in
accordance with MIL-C-23269 —
(see Part Number section)Failure rate
2 = L level, 2%/1000 hrs.
3 = M level, 1%/1000 hrs.

PART MARKING

M23269 J
10-2001
CGW 77ASTYLE
CYR51,
52, 53

M23269 — Military specification
established reliability
glass capacitor

J — Jan

10 — Slash sheet for case sizes —
CYR51, CYR52, CYR53

2 — Failure rate (L level)

001 — Capacitance value coded in
accordance with MIL-C-23269

CGW — Corning Glass Works

77 — Year

A — Lot Code

Cross-Reference Information

MIL-C-23269	MIL-C-11272
Style	Style
CYR10	CY10
CYR15	CY15
CYR20	CY20
CYR30	CY30
CYR51	CY06
CYR52	CY07
CYR53	CY08

Resistor Packaging

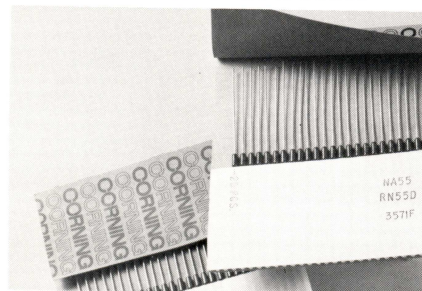
CORNING

STANDARD REEL PACKAGING



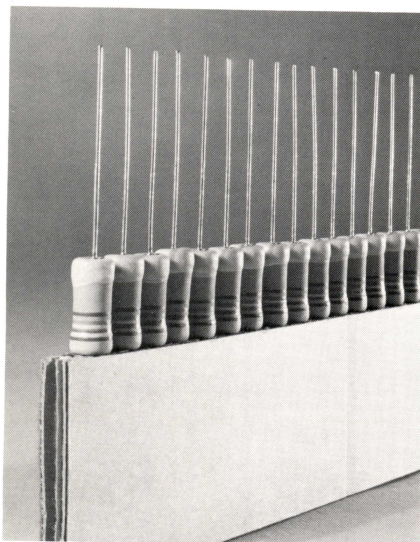
TYPICAL STYLES	QUANTITY PER REEL		PITCH	TAPE SPACING
	MIN.	MAX.		
C3, C05, RLR05, RN50	500	5000	.200	$2\frac{1}{16} \pm \frac{3}{32}$
FP55, FP $\frac{1}{4}$, RN55, RNC55, RL07, RLR07, L04, FL4	500	5000	.200	$2\frac{1}{16} \pm \frac{3}{32}$
FP60, FP $\frac{1}{2}$, RN60, RNC60, RL20, RLR20, L05, FL5	500	3000	.200	$2\frac{1}{16} \pm \frac{3}{32}$

CORNING MATCHPACK



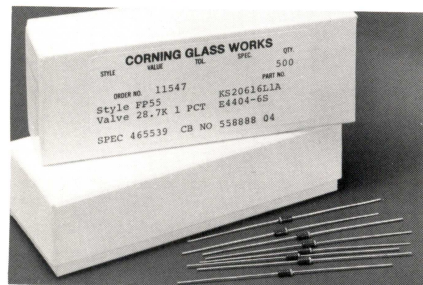
TYPICAL STYLES	PACKAGE QUANTITIES	
	STRIP	BOX
C3, C05, RLR05, RN50	25	500
RN55, RNC55, RL07, RLR07, L04, FL4	25	500
RN60, RNC60, RL20, RLR20, L05, FL5	25	250/500

STRIP PACK



TYPICAL STYLES	PACKAGE QUANTITIES	
	NO. OF PIECES PER STRIP	NO. OF STRIPS PER BOX
RN60, RL20, FP60, FP $\frac{1}{2}$	40	25
RL32, FP1, RN65	34	10
RL42, FP2	25	10
FP3	25	10
FP4	25	10
FP5	25	10
FP7, FP10	25	10
FP67	25	10
FP69	34	10

CENTURY PACK



TYPICAL STYLES	MIN.	MAX.
All Resistors	100	500
Increments of 100 only		

OTHER PACKAGING OPTIONS . . . Available on request.